Undergraduate students' intention to participate in the stock market

An analysis of financial literacy as well as attitudinal and normative factors

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Abstract

Background and Objective: Consumers are being confronted with increased responsibility for their own financial well-being and retirement planning. This reality is also highly relevant to young adults such as university students, who, upon entering professional life, need to make a high number of financial decisions, often with long-term implications and consequences. One noticeable phenomenon, frequently called the “stock market participation puzzle” (SMPP), is that consumers often refrain from owning stocks despite evidence that stock market participation (SMP) is highly beneficial for consumers. This puzzle is particularly relevant from a German perspective as German households frequently refrain from SMP preferring to place savings in low-risk and low-return investment products.

Study Design: This study addresses a gap in literature as SMPP is not well understood from a German perspective and prior SMPP research has not focussed on university students. Consequently, this study utilizes a quantitative approach based on an online self-completion questionnaire distributed to undergraduate students at a German university (Reutlingen University). A total of 315 completed questionnaires (N = 315) were collected. The questionnaire is based on the “reasoned action approach” (RAA) framework relating the predictor variables attitude (FA), perceived social norms (PSN), and perceived behavioural control (PBC) as well as actual control (AC) to the outcome variable behavioural intention to participate in the stock market (BI), controlling for socio-demographic and character-based variables. Financial literacy (FL) is assessed in two distinct dimensions as objective (OK) and subjective financial knowledge (SK) and conceptualised as AC and PBC respectively within the RAA framework. The hypothesis testing applied bivariate and multivariate statistical analysis.

Results: The theoretical framework is highly relevant for explaining behavioural intention. The regression models achieve a good model fit with the predictor variables explaining between 58.1% and 64.5% of the variance in the outcome variable. All predictor variables as well as the variable actual control make statistically significant positive contributions to the prediction of BI. The empirical evidence suggests the existence of a gender gap in relation to both SMP and FL as female respondents achieve a lower level of OK, exhibit a lower level of SK, and consequently also demonstrate a lower BI than male respondents.

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Declaration

Whilst registered as a candidate for the above degree, I have not been registered for any other research award. The results and conclusions embodied in this thesis are the work of the named candidate and have not been submitted for any other academic award.

Signature of DBA Candidate

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Abbreviations

Abbreviation	Explanation
AC	Actual control
AOK	Advanced objective (financial) knowledge
BI	Behavioural intention, in the context of this research indicating "intention to participate in the stock market"
BOK	Basic objective (financial) knowledge
EVM	Expectancy-value model of attitude (see Fishbein, 1963; Fishbein & Ajzen, 2010)
FA	Financial attitude
FB	Financial behaviour
FL	Financial literacy
FLE	Financial literacy education
GDPR	General Data Protection Regulation (EU) 2016/679
OK	Objective (financial) knowledge
OK-3	OK based on the "Big Three" questions (see Table 19)
PBC	Perceived behavioural control
PSN	Perceived social norm
Q.x.y.z	Refers to the question item according to the numbering logic in the survey instrument (see Appendix C)
RAA	Reasoned action approach
SK	Subjective (financial) knowledge
SM	Stock market
SMI	Stock market image
SMP	Stock market participation
SMPP	Stock market participation puzzle
TOK	Total objective (financial) knowledge
TPB	Theory of planned behaviour

1 Introduction

1.1 Overview

Chapter 1 provides an overview of this research study. The following sections contain an introduction to the background and the identified gaps in the literature as well as the motivation for this research. Further, the research objectives and questions are summarised before the research scope is considered. Finally, a brief summary of the results and the potential research contributions are presented. The chapter concludes by outlining the structure of this thesis.

1.2 Research Background and Research Problem

The financial environment that consumers face today is becoming increasingly complex, requiring a complicated set of financial decisions. This reality is also highly relevant to young adults such as university students, who, upon entering professional life, need to make a high number of financial decisions, often with long-term implications and consequences that may hinder their wealth accumulation (Sundarasen, 2017). One particularly relevant aspect is the stock market participation puzzle (SMPP), which observes that a significant fraction of households across many countries do not hold or invest in stocks (Haliassos & Bertaut, 1995). This observation persists despite portfolio theory models (Markowitz, 1952; Merton, 1969) rationally suggesting that consumers should hold at least some stocks. Non-participation in the stock market is deemed to be economically important and may result in a substantial utility loss of almost 2.0% of annual consumption (Cocco, Gomes, & Maenhout, 2005). A number of variables (see section 2.4.4 for a detailed discussion) are frequently associated with differing SMP rates, including socio-demographic factors – in particular, the wealthy and well educated as well as men are more likely to participate (Eugster, 2019; Guiso & Sodini, 2012), character-based psychological factors (Mauricas, Darškuvienė, & Mariničevaitė, 2017; Sivaramakrishnan, Srivastava, & Rastogi, 2017; van Rooij, Lusardi, & Alessie, 2011b), and social norms (Arrondel, Debbich, & Savignac, 2015; Guiso & Jappelli, 2005; Hong, Kubik, & Stein, 2004). However, arguably, most research attention focuses on the association between financial literacy (FL) and SMP (see the discussion in section 2.4.4.3, in particular Table 2). The FL of university students is also a widely researched subject (see section 2.5); however, prior studies (see the discussion in section 2.5.2) suffer from a number of conceptual weaknesses, such as failing to define what FL actually is. Studies stipulate a number of explanations to explain the SMPP, but individual explanations fail to explain all the observations associated with SMP. This suggests that research should focus on determining which explanations are more relevant to which group of investors (Guiso & Sodini, 2012). Prior

SMP research (see Table 13 in section 2.6) largely focuses on large panel studies conducted with cross-sectional consumer samples or mature samples nearing retirement. No prior research analysing the SMPP with a specific focus on university students has been identified despite theoretical life cycle models suggesting that significant and lifelong consumption penalties arise from stock market non-participation (Cocco et al., 2005) and that financial mistakes in early adulthood at an early stage can prove to be costly in later life (Lusardi, Mitchell, & Curto, 2010). As a consequence, the SMPP is not only relevant to the overall population but also deserves attention for younger population strata, such as university students.

Furthermore, the SMPP is particularly relevant in the German context as the average net worth of households in Germany decreased in real terms by almost 15% from 2003 to 2013 despite the savings ratio of private households having been in excess of 9% over the past 20 years (Grabka & Westermeier, 2015; OECD, 2018). One of the reasons suggested for this decrease is that German households prefer to place their savings in low-risk and low-return investment products that frequently do not even compensate for inflation (Grabka & Westermeier, 2015; Stolper & Walter, 2017). Direct and indirect (investment fund) stock ownership in Germany – despite a highly sophisticated and accessible banking system – is still overall lower than in most other comparable countries (Deutsches Aktieninstitut, 2015; OECD, 2018).[1] Nevertheless, the SMPP is not adequately researched or well understood from the German perspective (Stolper & Walter, 2017). Consequently, these factors constitute a gap in the literature that this research study seeks to address by analysing the factors that have an influence on the behavioural intention (BI) of German university undergraduate students to participate in the stock market.

1.3 Research Motivation

The author's motivation to conduct this research study in the context of the University of Portsmouth DBA programme did not stem from a specific organisational or management-related issue but rather from the interaction between professional career development in the financial services industry (more specifically in the wealth management industry) and personal experience, originally as a business student and private investor in financial markets. From a personal and professional standpoint, the perceived reluctance of well-educated and economically literate social peers and even fellow financial services professionals to consider

[1] Ownership of "shares and other equities" in Germany in 2014 was 9.9% (US: 35.1%; Austria: 21.3%; France 20.5%) and of "mutual fund shares" was 9.5% (US: 11.3%; Austria: 8.3%; France 6.6%). In contrast: "currency and deposits" in Germany in 2014 were owned by 39.2% (US: 13.1%; France: 28.8%; Austria: 40.1%). Note that all percentages are a fraction of the total financial assets.

stock market participation was always perceived as confounding and inexplicable. Personal socialisation by the author's parents was also extremely opposed to SMP based on a high degree of risk aversion. The author's introduction to SMP came through his older brother's guidance and encouragement. Furthermore, personal experience as a business school student led to the realisation many years later that university studies as well as professional development educate strictly in the application of skills in a corporate and professional setting, and no formal education is provided in terms of personal finance management in areas such as investment and savings in general and SMP in particular. Developing experience and effective personal practices in personal finance management is left to a potentially costly trial-and-error approach or to self-education. Even nearly 20 years after the author's own undergraduate studies at Reutlingen University, this situation remains unchanged. Discussion of these issues and experiences with social and professional peers led the author to the realisation that this experience was by no means an isolated or even particularly special case. On an anecdotal level, these encounters also led to the understanding that reluctance regarding SMP and other beneficial FBs does not necessarily only stem from a lack of financial knowledge but also comes from deeply ingrained behavioural misconceptions and biases of otherwise highly literate persons. Consequently, these experiences kindled the author's interest in the topic of financial literacy among young adults and students in general and in the SMP context in particular. Initial literature research led to the realisation that these issues constitute a fairly poorly researched area specifically in the context of German university students.

1.4 Research Objectives

An analysis of past studies on financial literacy (FL) and subsequent financial behaviour (FB) found positive associations; however, FL's effects on FB diminish dramatically when controlling for the effects of psychological traits (Fernandes, Lynch, & Netemeyer, 2014). To address the gap in the literature introduced in section 1.2 as well as the shortcomings of past research that does not consider psychological characteristics, this study applied the reasoned action approach (RAA) framework (Fishbein & Ajzen, 2010), which is an integrative and empirically proven framework for the prediction (and change) of human social behaviour. The RAA contends that the processes underlying all human social behaviour are similar and can be described by a small set of variables; specifically, attitudes towards a behaviour (FAs), perceived norms (PSNs), and perceived behavioural control (PBC) determine behavioural intention (BI), which ultimately serves to predict behaviour (Fishbein & Ajzen, 2010). Consequently, the purpose of this research was to apply hypothesis testing (bi-variate correlation and multiple linear regression modelling) by relating the RAA predictor variables *FA*, *PSN*, and *PBC* to the *behavioural intention to participate in stock markets* (outcome

variable, BI) for undergraduate students at a German university while considering and controlling for socio-demographic and character-based variables frequently found to be relevant to SMP and FL. Consequently, the research sought to investigate the following questions:

- Is the RAA approach a reasonable framework for the prediction of financial behaviours such as SMP?
- To what extent are the variables OK, SK, PSN, and PBC associated with and predictive of BI?
- To what extent do character-based variables as well as socio-demographic variables affect BI as well as higher-order predictor variables (OK, SK, PSN, and PBC)?
- What is the level of OK of university students at Reutlingen University?

This study addressed a research gap (see section 1.2) and contributes to the SMPP and FL literature by comprehensively and systematically assessing the factors that play a role in shaping university students' BI. To the extent that improving future SMP rates is deemed to be a desirable policy objective, the results of this study have important implications for policy makers as well as financial educators. The results suggest that improving OK and more importantly SK will yield positive benefits, thus reinforcing the importance of personal financial education programmes. Furthermore, to improve the effectiveness of such programmes, the focus should be on the specific personal benefits ("wealth-creating capacity") that SMP can offer university students over the longer term of their life cycle rather than on the generic conveyance of financial knowledge. Furthermore, active experimentation with SMP should be encouraged as this might positively influence BI both directly and indirectly by improving the level of SK.

1.5 Summary of the Results

The study concluded that the RAA framework is highly relevant for explaining BI: the linear regression models achieved a good model fit based on the R-square, with the predictor variables explaining between 58.1% and 64.5% of the variance in the outcome variable BI. All the RAA predictor variables (FA, PSN, and PBC) make statistically significant ($p < 0.001$ for all the RAA variables) positive contributions to the prediction of BI. Consequently, all primary null hypotheses suggesting that the predictor variables PSN, PBC, and FA will not influence BI can be rejected as they all appear to influence BI positively, as expected in the directional alternative hypotheses. Based on these results a conceptual framework for the prediction of BI can be specified that further develops prior concepts (Huston, 2010; Tang, Baker, & Peter, 2015). The empirical results may further make a contribution to the previous endogeneity concerns suggesting that the direction and/or causality of the relationship between FL and FB

are difficult to establish due to unobserved individual characteristics (Eugster, 2019; Fernandes et al., 2014). Despite controlling for character-based as well as socio-demographic factors in the linear regression model, the explanatory significance of AC/OK and PBC/SK suggests that FL conceptualised in these two distinct dimensions is relevant to the formulation of BI. However, the empirical results indicate that the contributions of PSN and FA are also highly significant. Within the dimension FA, the sub-dimension “wealth-creating capacity” is found to be particularly relevant to the prediction of BI. Substituting the composite attitude score for the direct measure “wealth-creating capacity” score leads to the result that “wealth-creating capacity” becomes by far the strongest positive predictor of BI while noticeably improving the predictive fit of the linear regression model.

The empirical evidence suggests the existence of a gender gap in relation to both SMP and FL as female respondents achieve a lower level of AC/OK, exhibit a lower level of PBC/SK, and consequently also demonstrate a lower BI to participate in the stock market than male respondents. These findings suggest that the lower BI might primarily be influenced by lower levels of FL rather than a higher level of risk aversion as suggested in some prior research when comparing female with male respondents. In this context, the study finds empirical evidence for the notion that risk aversion has a statistically significant negative and direct impact on BI. In contrast, a higher level of risk tolerance might work indirectly by means of a higher level of PBC.

In terms of OK assessment, 81.0% of the respondents achieved an adequate BOK score (mean score of 73.27% of BOK questions answered correctly) whereas only 41.0% of respondents achieved an adequate AOK assessment (mean of 57.1% of AOK questions answered correctly). In combination, this leads to an adequate TOK assessment for just over half of the respondents, indicating a mean of 61.6% of TOK questions answered correctly. This compares to a mean percentage of correct answers amounting to 57% in an analysis of 21 studies reporting OK assessments, suggesting that the respondents in this study scored slightly above average, not considering the advanced nature of the AOK questions utilised in this assessment instrument.

1.6 Contribution of the Research

This study contributes to the SMP and FL knowledge base by assessing the relationships and predictive contributions of lower-order socio-demographic and character-based background variables to higher-order predictor variables and ultimately BI as a relevant outcome variable specifically for young adults at a German university. The comprehensive application of the RAA framework confirms observations of factors previously identified as being associated with higher SMP rates as well as higher levels of FL and suggests more detailed explanations of

the mechanisms through which these factors might influence BI. In addition, the RAA application addressed prior findings suggesting that the influence of FL on FB diminishes when including psychological traits in the research set-up. To that extent, this study found that, while other characteristics and factors are important, FL conceptualised along two distinct dimensions of OK and SK has significant predictive value for BI, with SK potentially being more relevant than OK. In conclusion, a conceptual framework for the measurement of factors relevant to the prediction of BI is proposed based on the empirical findings of this research. Due to the focus group consisting of university students, for whom actual SMP might not yet be practical due to financial circumstances, actual FB was not measured in the context of the RAA. The comprehensive instrument developed for this research can be deemed valid and reliable and thus might be of interest to researchers as it can be deployed in other relevant settings and populations.

1.7 Structure of the Thesis

Chapter 2 reviews the literature related to SMP, the SMPP, and the FL construct. The review outlines the economic importance of SMP and then discusses variables encompassing FL, norms, and the socio-demographic and character-based factors found to predict SMP rates in detail before examining the rationale of the existing explanations for the SMPP phenomenon. The FL construct, with a specific focus on university students, is then appraised in detail by means of a synthesis approach, evaluating 37 data sets measuring FL and considering the dimensions covered, the construct definition utilised, and the instruments and methods employed to measure FL. Further, the factors associated with the FL levels among university students are reviewed. The chapter concludes with an appraisal of the current state of the literature and its implications for this research study.

Based on the implications of Chapter 2, the following Chapter 3 introduces the RAA as the theoretical framework utilised before discussing the operationalisation and measurement approaches to the relevant predictor and background variables as well as the outcome variable BI (section 3.2). The primary and secondary hypotheses to be tested are posited and explained. Furthermore, Chapter 3 (section 3.3) outlines the reason for employing the positivist research paradigm and a deductive approach to theory development based on hypothesis testing before defining the research strategy and the data collection methods, including the pilot studies encompassing an RAA elicitation study as well as the procedures used to pre-test the self-completion questionnaire. The chapter further considers the set-up of the study population of undergraduate students at Reutlingen University, to whom a census distribution of the survey was applied. The required sample size is determined by means of a power analysis to allow for statistical inferences before considering the reliability and validity of the study and discussing the measures adopted to mitigate any ethical risks inherent to this

research. Chapter 4 covers the descriptive statistical analysis (section 4.1), assessing each relevant background factor, the predictor variables (FA, PSN, PBC, and AC), and the outcome variable (BI) by means of univariate analysis as well as sub-sample data exploration. Furthermore, the formal hypothesis testing by means of Pearson's correlation and multiple linear regression modelling is covered in Chapter 4 (section 4.2). The salient findings from sections 4.1 and 4.2 are discussed in section 4.3, resulting in the definition of a conceptual framework. Chapter 5 summarises the key findings, discusses the implications and potential contributions of this research study, considers the relevant research limitations when interpreting the results, and outlines areas for potential future research. Finally, Chapter 5 includes a brief reflection on the experience of conducting this research project within the DBA programme. As outlined above, the following Chapter 2 appraises the state of the literature underlying this research study.

2 Literature Review

2.1 Introduction

As policy makers globally are increasingly shifting retirement planning and provisioning responsibilities to private consumers, there is a widespread consensus that the financial environment that consumers face today is becoming more complex, requiring an increasingly convoluted set of financial decisions (Cole, Paulson, & Shastry, 2014; Erner, Goedde-Menke, & Oberste, 2016; Spataro & Corsini, 2017; van Rooij, Lusardi, & Alessie, 2012). Consequently, the subject area of consumer challenges relating to personal finance issues such as investments, savings, and retirement preparation has moved further into focus as consumers have gained more choice and formal control over their household financial decisions than ever before (Hadar, Sood, & Fox, 2013; Özdemir, Temizel, Sönmez, & Er, 2015; van Rooij et al., 2012; West, 2012).

One specific aspect of inquiry, termed the SMPP, is the observation that a significant fraction of households across many countries do not hold risky assets such as stocks, despite historical excess average returns over riskless assets (Haliassos & Bertaut, 1995). Limited SMP and the SMPP are considered to be one of the "investment mistakes" in the personal finance context (Campbell, 2006). Consequently, research exploring individual investors' limited SMP has intensified (Dobni & Racine, 2015), sparked by behavioural finance debates trying to identify the drivers of SMP (Akhtar, Muhammad, & Siddiqui, 2018). Nevertheless, despite a growing volume of research and progress in explaining economic rationality, the precise mechanisms through which factors such as FL and character-based variables affect SMP remain poorly understood (Akhtar et al., 2018; Cheng, Mutuc, Tsai, Lu, & Lin, 2018).

The following sections provide a summary of the state of research, starting with an overview of issues relating to consumer objectives and challenges in personal financial management (sections 2.2 and 2.3). The SMPP phenomenon, its economic importance, the predictor variables frequently found to influence SMP, and potential SMPP explanations are then reviewed (section 2.4). The following section discusses the FL construct (section 2.5) as well as recent studies analysing FL in a university student context. Section 2.6 outlines the conclusion on the review of the literature pertaining to the SMP and FL subject matter. The approach to the literature review is outlined in Appendices A and B.

2.2 Consumer Challenges

Consumer finance – how households and consumers use financial markets to achieve their objectives – has attracted considerable research attention over the past decade (Guiso & Sodini, 2012) as the financial environment that consumers face has become more complex,

requiring an increasingly complicated set of financial decisions (Cole et al., 2014; Erner et al., 2016; van Rooij et al., 2012). Allgood and Walstad (2016, p. 675) point out that

> Adults must manage household budgets subject to income constraints, buy goods and services, monitor financial accounts, handle credit cards, save and invest for a future event such as a child's college education or retirement, purchase insurance to reduce risk, pay taxes, and seek sound financial advice. The difficulty of knowing all that a person should know about personal finance in an ever-changing and more complex financial world is an enormous challenge for even the most educated adults, although the importance of some of this knowledge will vary based on phases of the life-cycle or personal circumstances. Yet, the consequences of not knowing even the basics about household financial matters can prove to be costly for adults as they make financial decisions for the short term or the long term.

The following matters were identified as most relevant consumer challenges in the literature reviewed.

Increased Complexity of Financial Products and Consumer Choice

The rapid development of financial markets has led to a growing number of providers offering financial products that are increasingly complex while simultaneously accessible to consumers (Azmi & Chong, 2014; Campbell, Jackson, Madrian, & Tufano, 2011; Geddes & Steen, 2016). This growth of available financial products in the consumer market has provided them with more choice and formal control over household financial decisions than ever before (Hadar et al., 2013; Özdemir et al., 2015; van Rooij et al., 2012; West, 2012). However, increased complexity and choice arguably require decision makers to have a sound understanding of these sophisticated products or at least the ability to judge the quality of any financial advice received about them (Stolper & Walter, 2017). Consequently, consumers run the risk of buying products that they may not fully understand (Bucher-Koenen & Lusardi, 2011).

Increased Consumer Responsibility for Financial Well-Being and Retirement Planning

Concurrently, as the complexity of financial products and services increases, consumer households are in many instances being asked to take more responsibility for important financial decisions, such as planning, saving, and investing for retirement (Azmi & Chong, 2014). On the liability side, as evidenced during the subprime mortgage crisis in the US, the dramatic increase in the range and complexity of credit products available to households has been accompanied by increased default, bankruptcy, and foreclosures (Cole et al., 2014) as consumers are responsible for negotiating complex mortgage products that they struggle to understand (Geddes & Steen, 2016) with potentially detrimental long-term effects on their financial well-being.

In contrast, on the asset side of the balance sheet, market liberalisation and thus reduced reliance on social security and employer-sponsored defined benefit plans and a shift to defined contribution pension plans require consumers to take responsibility for their own financial well-being, leading to the growing importance of private retirement planning, creating the need for consumers to determine the amount that they save as well as the mix of assets in which they invest and consequently control their own investment risk (Cole et al., 2014; Geddes & Steen, 2016; Stolper & Walter, 2017; van Rooij, Lusardi, & Alessie, 2011a). Insufficient savings and poor financial decision making are major concerns in the face of greater reliance on individual financial retirement provisions (Lührmann, Serra-Garcia, & Winter, 2015). One noticeable phenomenon, called the "stock market participation puzzle" (SMPP) or "stockholding puzzle" is that consumers frequently refrain from owning stocks despite the convincing evidence that SMP is highly beneficial for consumers (Guiso & Sodini, 2012; Sivaramakrishnan et al., 2017) and portfolio theory suggests that households should invest at least a fraction of their wealth directly or indirectly in stocks to take advantage of the equity premium (Guiso & Sodini, 2012) as well as asset diversification. The literature pertaining to SMP and the SMPP will be analysed in detail in the subsequent section 2.4.

2.3 Relevance to University Students

The consumer challenges reviewed in section 2.2 are particularly applicable to university students as a focus group. In particular, the notion of the increased complexity of financial products and increased choice is relevant as, after graduating from secondary school, students and, respectively, young adults face increasingly complex and important financial decisions in the pursuit of financial well-being while balancing the temptations of a consumption-based global economy (Erner et al., 2016; Sundarasen, 2017). Financial decisions made at a young age have a lasting effect on long-term financial welfare and may hinder wealth accumulation (Sundarasen, 2017) as well as adversely affecting academic performance, social relationships, and physical and emotional well-being (Bamforth, Jebarajakirthy, & Geursen, 2017) in the short-term. Figure 1 (see section 2.4.2) illustrates the superiority of SMP for wealth-building purposes over the longer-term. In particular, young adults can make optimal use of this effect due to the long investment horizons if SMP is commenced as soon as feasible. Lusardi, Michaud, and Mitchell (2015) suggest that over half of lifetime wealth inequality can be attributed to heterogeneity in financial knowledge and consequently suboptimal decision making in early adulthood as financial mistakes at an early stage can prove to be costly (Lusardi et al., 2010), particularly due to suboptimal use of the long-term compound interest effect.

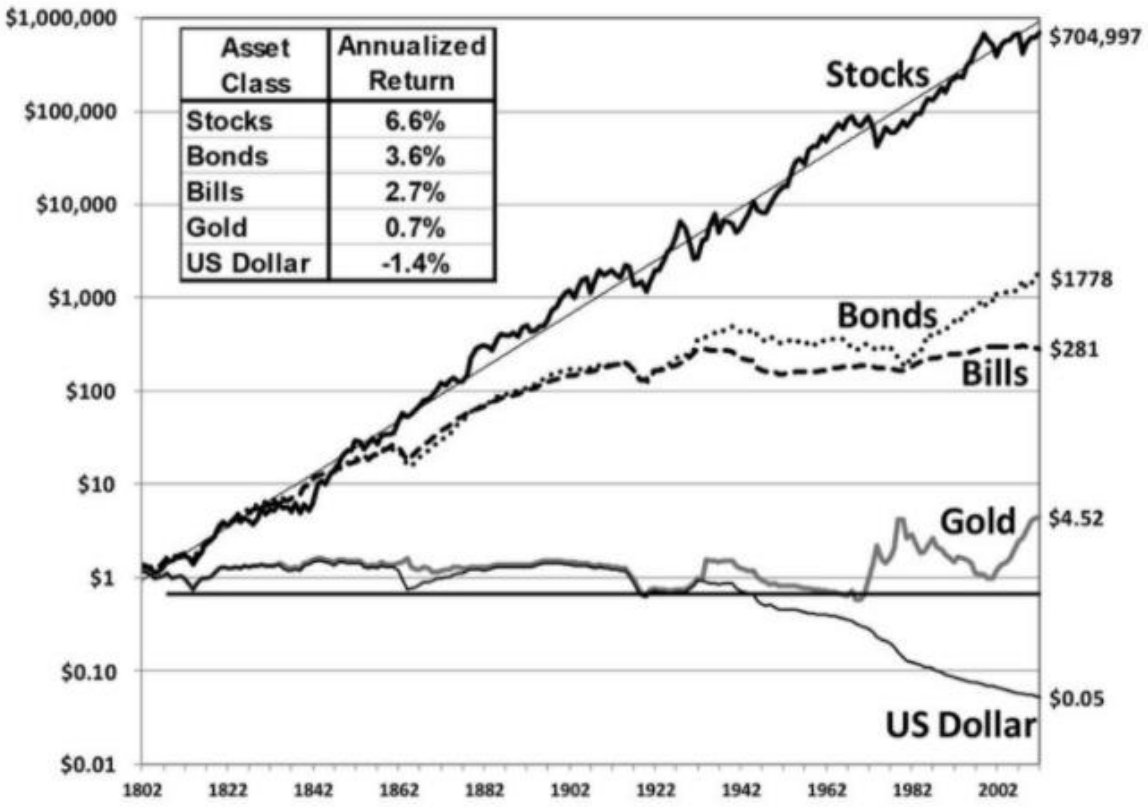
2.4 Stock Market Participation Puzzle

2.4.1 Introduction

In principle, SMP refers to the participation of consumers in risky asset financial markets. SMP can be differentiated either by considering only the direct holding of individual stocks (e.g. Thomas & Spataro, 2018; Vestman, 2019) or by including indirect participation (in particular by means of mutual funds) in SMP (e.g. Christelis, Georgarakos, & Haliassos, 2013; Eugster, 2019; Guiso & Sodini, 2012; van Rooij et al., 2011b). Traditional normative portfolio theory models (Markowitz, 1952; Merton, 1969) suggest that consumers should rationally choose to hold at least part of their assets in stocks unless they are infinitely risk averse or there is no expected equity risk premium in the market (Gardini & Magi, 2007; Guiso & Sodini, 2012; Mauricas et al., 2017). The long-term empirical evidence underlines the existence of a positive equity premium (Mehra & Prescott, 2003). Nevertheless, Guiso and Sodini (2012) state that research commonly finds that SMP has different rates across countries (this also applies to developed countries with similar GDP per capita rates; see Table 1) that generally increase with wealth; however, even at high wealth levels, some households do not hold stock. In the next section, the economic importance of SMP is reviewed before the SMPP and its potential explanations and evidence are appraised.

2.4.2 *Economic Importance of SMP*

Figure 1 - Total Real Returns on U.S. Stocks, Bonds, Bills, Gold, and the Dollar, 1802 – 2012



Source: Siegel (2014, p.6)

The fact that a significant fraction of consumer households does not invest in stocks despite historical excess average returns (Haliassos & Bertaut, 1995; Mehra & Prescott, 2003) is not only puzzling in its contradiction of traditional portfolio theory (see the previous section) but also suggests significant economic impacts both on the societal and on the individual household level. Figure 1 shows the cumulative real return on U.S. stocks, bonds, bills, gold and the US dollar: Whereas one US dollar invested in U.S. stocks in 1802 would amount to 704,997 US dollars in 2012 indicating an annualized return of 6.6%, one US dollar held in cash would amount to merely 0.05 US dollars in 2012 due to inflation (an annualized return of -1.4%). The overview of Figure 1 clearly indicates the superior wealth-building potential of SMP in the longer-term over alternative asset classes and underlines the importance of SMP both on a societal and individual level. An example of the economic impact is the case of Germany: the average net worth of households in Germany decreased in real terms by almost 15% from 2003 to 2013 despite the savings ratio of private households having been in excess of 9% over the past 20 years (Grabka & Westermeier, 2015; OECD, 2018). One of the reasons suggested for this decrease is that German households prefer to place their savings in risk-averse low-return investment products that frequently do not even compensate for inflation

(Grabka & Westermeier, 2015; Stolper & Walter, 2017). Modelling a life cycle model of consumption and portfolio choice, Cocco et al. (2005) estimate that non-participation in the stock market would result in a substantial utility loss of almost 2.0% of annual consumption. For young adults, the notion of increased complexity of financial products and increased choice is relevant as, after graduating from secondary school, students and young adults face increasingly complex and important financial decisions in the pursuit of financial well-being while balancing the temptations of a consumption-based global economy (Erner et al., 2016; Sundarasen, 2017).

2.4.3 SMP Participation Rates

A comprehensive compilation (see Table 1) of household SMP rates, differentiated by the country and wealth level of the respondents, by Guiso and Sodini (2012) shows that participation rates vary greatly by country and wealth quartile. While countries like the US, the UK, Switzerland, and Sweden reach direct and indirect SMP rates in excess of 30%, other developed countries, such as Germany, remain significantly below this threshold. Furthermore, it is noticeable that the degree of stockholding increases with the wealth quartile, yet the top 5% wealth category in general also contains a significant (in many instances even the majority) proportion of households that abstain from the stock market. Similar results in terms of SMP rates are reported by Christelis et al. (2013). However, it has to be noted that the data for European countries in both studies (Christelis et al., 2013; Guiso & Sodini, 2012) are drawn from the Survey of Health, Ageing, and Retirement in Europe (SHARE), which covers only those aged 50 or above (Christelis et al., 2013). The results might thus not be comparable to a university student sample, as used in this research. In the following section, other observed factors that are associated with variances in SMP rates are reviewed before the current state of explanations for the SMPP is assessed in section 2.4.5.

Table 1 – Proportion of Households Investing in Stocks

A. Direct Stockholding

	Quartile I	Quartile II	Quartile III	Quartile IV	Top 5 %	Average
U.S.	1.4	6.9	20.6	47.9	70.1	19.2
U.K.	0	4.4	28.3	53.6	67.9	21.6
Netherlands	1.5	7.4	20	40.3	60.2	17.2
Germany	0.6	4.1	16.1	36.1	50.5	14
Italy	0	0.8	3.1	12.8	30.8	4
Austria	0	1.7	2.8	15.6	25.7	5
Sweden	12.9	30.7	46.9	72.8	80.6	40.8
Spain	0	0.3	1.8	13.2	14.4	3.5
France	0.7	9.9	14.6	33.3	44.2	14.4
Denmark	6.3	25.9	36.4	55.6	68.4	31
Greece	0	0.7	3.2	17.3	23.5	4.9
Switzerland	2.8	12.2	30.3	54.2	63.2	24.9

B. Direct and Indirect Stockholding

	Quartile I	Quartile II	Quartile III	Quartile IV	Top 5 %	Average
U.S.	4.4	38.3	66	86.7	93.7	48.9
U.K.	4.9	11.9	37.8	71.1	83.9	31.5
Netherlands	1.7	11	31.3	52.8	72	24.1
Germany	1.5	11.8	28.7	51.4	61.2	22.9
Italy	0	0.8	5.2	27.5	64.8	8.2
Austria	0	1.9	8.1	25.5	33.8	8.8
Sweden	25.8	63.4	82.7	92.9	95.8	66.2
Spain	0	1.1	3	19.1	24.6	5.4
France	1.1	17.6	29.9	57.6	67.3	26.2
Denmark	6.6	30.8	44.8	65.7	75.4	37
Greece	0	0.7	4	22.2	32.9	6.3
Switzerland	2.8	20	38.2	63.7	65.8	31.4

Source: Guiso and Sodini (2012, p. 173)

The first panel (Guiso & Sodini, 2012) in Table 1 shows the proportion of households that own stock directly in each quartile of gross financial wealth. The second panel shows the same proportion when indirect ownership is included, via mutual funds or pension funds. Data for European countries were computed from the 2004 wave of the Survey for Health, Ageing, and Retirement in Europe (Share) and refer to the year 2003. Data for the US were drawn from the 1998 Survey of Consumer Finances. Data for the UK were taken from the 1997–1998 Financial Research Survey.

2.4.4 SMP Predictor Variables

2.4.4.1 Introduction

Research highlights a number of factors that are associated with variances in SMP rates. These factors encompass socio-demographic factors (see section 2.4.4.2), FL (see section 2.4.4.3 and section 2.5.3), character-based factors (see section 2.4.4.4), and social norms (see section 2.4.4.5).

2.4.4.2 Socio-demographic Factors

Socio-demographic factors are frequently found to affect SMP rates. As outlined comprehensively (see Table 1) by Guiso and Sodini (2012) and confirmed by other studies (Arrondel et al., 2015; Briggs, Cesarini, Lindqvist, & Ostling, 2015; Campbell, 2006; Eugster, 2019; Guiso, Haliassos, & Jappelli, 2003; Guiso & Jappelli, 2005; Haliassos & Bertaut, 1995), SMP rates increase with wealth and income levels. This finding is also confirmed for derivatives markets (Hsiao & Tsai, 2018). Explanations for this effect (see section 2.4.5) include lower relative participation costs as well as socialisation peer effects (Guiso et al., 2003).

A further factor that receives considerable research attention is women's lower likelihood of participating in stock markets when compared with men (Almenberg & Dreber, 2015; Eugster, 2019; Halko, Kaustia, & Alanko, 2012; Thomas & Spataro, 2018; Vohra & Kaur, 2016). Similar to the wealth effect, the gender effect is also observed in derivatives markets (Hsiao & Tsai, 2018). Explanations offered for the gender effect are lower levels of FL (Almenberg & Dreber, 2015; Eugster, 2019; Vohra & Kaur, 2016) and higher levels of risk aversion (Almenberg & Dreber, 2015; Halko et al., 2012) along with lower awareness of stock markets (Vohra & Kaur, 2016) in comparison with men.

As predicted by life cycle models (Campbell, 2006; Cocco et al., 2005), the likelihood of SMP increases with age (Arrondel et al., 2015; Eugster, 2019) up to the retirement age and then starts to drop (Guiso et al., 2003). This observation appears reasonable as labour income is turned into savings and other assets over the course of the working life, thus increasing the resources available for SMP. Financial advice frequently suggests that older people should reduce their risky assets (Cocco et al., 2005), thus potentially leading to reduced SMP rates in later stages of the life cycle.

Furthermore, research suggests that stockholders appear to be more educated than non-stockholders. Eugster (2019), utilising survey data from New Zealand, finds that stock and mutual fund ownership rates increase from 16.0% for respondents without a secondary school certificate to 34.3% for university postgraduates. The correlation of education with SMP rates is confirmed in further research considering both general levels of education (Arrondel et al., 2015; Briggs et al., 2015; Guiso et al., 2003; van Rooij et al., 2011b) and more specifically economics education (Christiansen, Joensen, & Rangvid, 2008). It is fair to assume that education is also correlated with levels of wealth and income. Furthermore, the education level of parents is found to be a significant predictor of children's level of FL (Akben-Selcuk & Altiok-Yilmaz, 2014; Al-Tamimi & Bin Kalli, 2009; Altintas, 2011; Huzdik, Béres, & Németh, 2014; Luksander, Béres, Huzdik, & Németh, 2014), while, in contrast, family income does not turn

out to be a significant predictor of FL (Akben-Selcuk & Altiok-Yilmaz, 2014), leading to the consideration of the relationship between FL and SMP in the next section.

2.4.4.3 Financial Literacy

Arguably no other aspect receives as much attention as the association between financial knowledge, or FL, and SMP. This section reviews the literature concerning the association between FL and SMP, while the FL construct literature is investigated in greater detail in section 2.5. Numerous studies covering developed as well as emerging economies have established a positive correlation between FL and the SMP rate (see Table 2 for details). Furthermore, FL appears to exert a positive influence on other factors, such as risk aversion: Dulebohn (2002) finds that individuals with a higher level of objective knowledge (OK) systematically choose higher levels of investment risk. Dulebohn (2002) suggests that the more complicated an investment choice is, the more significant the role of OK in the risk behaviour process is. This suggestion underlines further findings showing that FL is also positively correlated with more complex financial decision-making processes, such as portfolio diversification, financial advice consultation, retirement planning, and pension plan participation (see the summary and references in Table 2). Assessing specific investment-related FL for university students, it is found that, even in studies in which university students perform well in terms of general personal finance concepts, the results of assessing specific investment knowledge (Wagland & Taylor, 2009) as well as the application of theoretical knowledge (Luksander et al., 2014) are much lower. Similarly, an assessment of university students' financial knowledge across a range of financial content domains shows that knowledge of investment-related items is much lower than knowledge in other subject areas (Hilgert, Hogarth, & Beverly, 2003; Sarigül, 2014). German high-school students are shown to have a persistently wrong perception of the risk–return profile of stock investments (Erner et al., 2016). These findings suggest that students might not take up SMP to the degree appropriate for their life cycle stage (Cocco et al., 2005) given the means to do so.

Table 2 – Correlation of FL with "Retirement Planning, Saving, and Investing"-Related FB

FB	Positive Correlation of FL (Yes/No)	Reference
Increased SMP rate	Yes	**Developed Economies** Almenberg and Dreber (2015); Arrondel et al. (2015); Calcagno and Monticone (2015); Eugster (2019); Gardini and Magi (2007); Guiso and Jappelli (2005); Klapper, Lusardi, & Panos, (2012); van Rooij et al. (2011b); Vohra and Kaur (2016); Yoong (2011); Yuan (2019) **Emerging Economies** Akhtar et al. (2018); Favilukis (2013); Hsiao and Tsai (2018); Mate & Dam (2017); Pan, Wu, and Zhang (2020); Sivaramakrishnan et al. (2017)
Increased portfolio diversification	Yes	Abreu and Mendes (2010); Van Rooij et al. (2011a)
Increased price sensitivity in choosing investment products	Yes	Hastings & Tejeda-Ashton (2008); Mueller & Weber (2010)
Regular savings and investment programme perceived as important	Yes	Chen and Volpe (1998)
Higher propensity to plan for retirement	Yes	Bucher-Koenen and Lusardi (2011); Van Rooij et al. (2011a)
	No	Almenberg and Save-Soderbergh (2011); Crossan, Feslier, & Hurnard (2011)
Higher likelihood of beneficial pension plan participation	Yes	Fornero & Monticone (2011)
Higher likelihood of consulting a financial advisor	Yes	Calcagno and Monticone (2015)

Despite this considerable amount of research linking FL to higher SMP as well as other desirable FB, establishing causality for the identified relationships is difficult due to endogeneity concerns (Eugster, 2019; Fernandes et al., 2014) and reverse causality (Jappelli & Padula, 2015; Thomas & Spataro, 2018). In particular, a meta-analysis by Fernandes et al. (2014) suggests that the effects of FL on FB diminish when controlling for psychological traits that are omitted in prior research. This finding is also corroborated by Tang, Baker, and Peter (2015), who find that a high level of financial knowledge does not necessarily indicate a high level of responsible financial behaviour while obtaining evidence that social and psychological factors are both influential in developing self-benefiting financial behaviour among young

adults. These findings are acknowledged with the RAA framework: Fishbein and Ajzen (2010, p. 53) stress that a lack of AC (which, in the context of this research, is conceptualised as OK) might have a causal effect in that it prevents the performance of a certain behaviour. However, the presence of AC over the specific behaviour does not in and of itself cause the person to perform the behaviour (Fishbein & Ajzen, 2010). Certain psychological traits identified in the literature as having an impact on SMP will be considered in the following section.

2.4.4.4 Character-Based Factors

Character-based or psychological traits are also frequently identified as affecting FB in general and SMP in particular. In this section, research evidence on risk aversion, trust, and sociability will be summarised.

Risky prospects such as SMP are characterised by their possible outcomes and by the probability of these outcomes occurring (Kahneman & Tversky, 1984). Consequently, risk aversion in a behavioural finance context can be defined as the preference for a sure outcome over a gamble with higher or equal expected value (Kahneman & Tversky, 1984). For the purpose of this review, the distinct but related concept of loss aversion[2] (Dimmock & Kouwenberg, 2010; Lee & Veld-Merkoulova, 2016) is also summarised. Research suggests that SMP is related to risk aversion (van Rooij et al., 2011b) to the extent that a lower level of risk aversion (Arora & Kumari, 2015; Dulebohn, 2002; Halko et al., 2012; Mauricas et al., 2017; Sivaramakrishnan et al., 2017; van Rooij et al., 2011b) or loss aversion (Dimmock & Kouwenberg, 2010; Lee & Veld-Merkoulova, 2016) leads to a higher SMP rate and, respectively, to a larger share of assets allocated to stocks. Risk aversion is also frequently suggested as an explanation for the gender gap (see section 2.4.4.2). FL and, respectively, OK might moderate the level of risk aversion (Dulebohn, 2002, see also section 2.4.4.3 above). However, risk aversion alone cannot explain why so many households do not hold stocks (Haliassos & Bertaut, 1995; van Rooij et al., 2011b). Stock purchase decisions require not only an assessment of the risk–return trade-off (see the previous section) but also an evaluation by the investor of whether the overall system is fair and can be trusted (Guiso, Sapienza, & Zingales, 2008). In this context, trust is defined as the subjective probability that individuals attribute to the possibility of being cheated, taking into account both the objective characteristics of the financial system and the subjective characteristics of a given person trusting it (Guiso et al., 2008). Consequently, a number of research studies find that a lack of

[2] Kahneman and Tversky (1984) define loss aversion as the intuition that the loss is more aversive than the gain on a fair bet.

trust in financial institutions (Mauricas et al., 2017) as well as in the stock market in general (Guiso et al., 2008) is associated with lower SMP.

Social people, that is, people who interact more with their neighbours and put themselves more frequently in social settings (Baker & Nofsinger, 2002), are more likely to learn about investing because they are exposed to a more social environment (Baker & Nofsinger, 2002; Hong et al., 2004). Consequently, the degree to which a peer group's social norms affect a person depends on that person's degree of sociability (Baker & Nofsinger, 2002). As such, sociability as a character trait and social norms can be deemed to be closely interrelated. The literature on the relevance of social characteristics and social norm effects will be reviewed in section 2.4.4.5.

2.4.4.5 Social Norms

The social environment is considered to be a factor that can exert a strong influence – so-called social norms - on people's intentions and actions. Research (Kallgren, Reno, & Cialdini, 2000; Reno, Cialdini, & Kallgren, 1993) supports the viability of social norms as strong behavioural directives; however, the ability of social norms (both injunctive and descriptive; see the elaboration in section 3.2.2.2.3.1) to direct behaviour seems to be tied to the degree to which they are focal at the time of the relevant behavioural act, suggesting that, if there is no salience, behaviour will be largely unguided by normative considerations (Kallgren et al., 2000). In a specific SMP context, higher participation rates are positively associated with social norms such as media consumption (Arrondel et al., 2015), the family context (Arrondel et al., 2015), social interactions (Brown, Ivković, Smith, & Weisbenner, 2008; Guiso & Jappelli, 2005; Hong et al., 2004; Liu, Zhang, & Yang, 2014), and financial advice (Eugster, 2019; Guiso & Jappelli, 2005; Pan, Wu, & Zhang, 2020). Considering young adults, the finding that individuals whose parents are stockholders are more likely to hold stocks themselves is noticeable (Arrondel et al., 2015) and indicates that parental socialisation might be significant in terms of SMP. The importance of parental influence on FB is also established by Tang et al. (2015), who find that parental influence relates positively to developing self-benefiting financial behaviour among young adults, and Jorgensen and Savla (2010), who conclude that parents are perceived to influence FA and FB but not OK. In particular, the non-significant relationship between perceived parental influence and OK is interpreted as indicating that parents are not giving their children financial knowledge (Jorgensen & Savla, 2010).

2.4.5 Potential SMPP Explanations

As outlined in sections 2.4.1 and 2.4.3, the implication of normative portfolio theory that consumers should rationally choose to hold at least some of their assets in stocks fails in

reality as a substantial fraction of households do not participate in risky asset markets. Guiso and Sodini (2012) offer three explanations for the SMPP.

Fixed Participation Costs: According to Vissing-Jorgensen (2003), consumers face participation costs such as monetary expenses (setting up an investment account) as well as information costs (learning about financial products, i.e. FL). Investors weigh the costs of participation against the benefits of investing in the stock market. This explanation reconciles with a number of observed factors, in particular FL and education (see sections 2.4.4.3 and 2.5.3), as well as risk aversion (see section 2.4.4.4) as these factors suggest more rational behaviour in understanding the risk/reward trade-off, thus increasing the proportion of wealth allocated to risky assets. However, this theory does not adequately explain the cross-country differences in stockholdings as well as the low stockholding of the wealthiest households in developed countries, such as the Netherlands, Germany, or Spain (see section 2.4.3).

Non-standard Preferences/Loss Aversion: In contrast to the fixed participation cost explanation, Barberis, Huang, and Thaler (2006) suggest that consumers with loss aversion preferences and narrowly framed portfolio decisions choose to stay out of the stock market even without direct participation costs while only the existence of risk aversion would not be sufficient to make that choice as the person would merge the SMP risk with other pre-existing risk factors, such as labour income risk or house price risk. As the stock market achieves a high mean return and a low correlation with those pre-existing risk factors, a person would not reject SMP purely on risk aversion considerations. In contrast, narrow framing occurs when a person who is offered a new gamble evaluates that gamble in isolation and separately from other risks (Barberis et al., 2006). In this context, Barberis et al. (2006) demonstrate that the decision to refrain from SMP (deemed a “small gamble with positive expected value”) is much easier to reach. This suggestion is empirically confirmed by Dimmock and Kouwenberg (2010), who find that loss aversion is correlated with the probability of participating in direct or indirect stock market investments, and Lee and Veld-Merkoulova (2016), who find that loss aversion is associated with lower stock investment as a share of the total assets. In addition, myopic loss aversion, which is defined as the combination of greater sensitivity to losses and frequent outcome evaluation (Lee & Veld-Merkoulova, 2016; Thaler, Tversky, Kahneman, & Schwartz, 1997), might also serve to explain the SMPP as taking a short-term view of investments might lead to overreaction to temporary recent losses, thus losing out on longer-term benefits (Thaler et al., 1997). Nevertheless, Guiso and Sodini (2012) caution that, while the combination of loss aversion and narrow framing can rationalise some households’ choice not to participate, this theory – similar to *fixed participation costs* – fails to explain the correlation between SMP and wealth levels, notably the lack of participation at high wealth levels as well as SMP cross-country differences.

Beliefs: Portfolio theory suggests that investors hold risky assets to earn the risk premium. If individuals believe that the stock market does not yield an expected return in excess of the risk-free rate, they will choose to stay out of the market, even in the absence of participation costs. *Beliefs* appear to offer a better explanation for the cross-country differences, as SMP is lower in countries with higher stock market volatility and higher in countries with a higher Sharpe ratio (Dimson, Marsh, & Staunton, 2002; Guiso & Sodini, 2012). The formation of beliefs about the risk–return trade-off also requires trust and confidence in information sources, financial advisors, portfolio managers, and, more generally, the overall reliability of the financial system (Guiso & Sodini, 2012). Furthermore, since trust does not vary much across wealth levels, it may serve to explain the limited participation even among the wealthy (Guiso & Sodini, 2012). In fact, Haliassos and Bertaut (1995) suggest that any single factor can make a big difference in the SMP choice for low-income households, but several factors are required to influence SMP for high-income households. Nevertheless, it appears reasonable to assume that the underlying FL informs the beliefs that consumers form about the risk–return trade-off of stock markets. Van Rooij et al. (2012) argue that financial literacy lowers the participation costs of collecting and processing information and thereby facilitates the execution of financial decisions and reduces the psychological thresholds for SMP. A study on German high-school students (Erner et al., 2016) finds that students share a general lack of financial knowledge and more strikingly have a persistently wrong perception of the risk–return profile of stock investments. West (2012) points out that financial literacy programmes should not only educate consumers about financial products but also highlight to individuals the psychological biases and limitations that they face. Dobni and Racine (2015, 2016) study the concept of stock market image and find that investors have highly heterogeneous perceptions of the stock market. These images, influenced by FL, propensity to trust, and sociability, are found to affect investment behaviours, including the decision to participate in or avoid stock markets (Dobni & Racine, 2015, 2016).

2.4.6 Conclusion

As reviewed in the preceding section 2.4, the literature on the SMPP is comprehensive and supports established facts that are difficult to explain with standard portfolio choice theory (Guiso & Sodini, 2012). The SMPP explanations provided (see section 2.4.5) all hold merit, yet no explanation is able to provide a compelling case explaining all related observations in connection with SMP (see sections 2.4.3 and 2.4.4). Consequently, research should focus on identifying when and which explanations are more relevant to which group of investors (Guiso & Sodini, 2012). The SMP rates in Germany are comparatively low (see Table 1) and partially responsible for a substantial decrease in household net worth in real terms despite the substantial savings ratio of private German households (see section 2.4.2). The investment

knowledge of university students is found to be lacking even when general knowledge of basic concepts is given (see section 2.4.4.3). As FL seems to be the factor that receives most attention in terms of SMP prediction, the next section reviews how researchers define and apply the FL construct in prior research.

2.5 Financial Literacy of University Students

2.5.1 Introduction

FL, its antecedent variables, and its relationship to FB in general and SMP in particular receive a significant and increasing amount of attention in research published since 2008 (Stolper & Walter, 2017). This section reviews the literature on the FL construct, while the association between FL and SMP is covered in section 2.4.4.3. Despite the prominence of FL research, no consensus on a standardised definition and measurement approach to FL emerges (Allgood & Walstad, 2016; Azmi & Chong, 2014; Fernandes et al., 2014; Hung, Parker, & Yoong, 2009; Huston, 2010; Remund, 2010). Remund (2010) notes that individuals and organisations conducting FL research by using their own definitions and measures of FL slow the research progress and hinder the ability to design meaningful and effective consumer FL education programmes. The heightened scholarly interest in consumer FL in recent years is clearly documented by the significant increase in the number of studies (Stolper & Walter, 2017). However, this begs the question of whether the research interest leads only to an increase in studies or also improves the individual quality of studies by addressing the shortcomings of earlier research noted by Huston (2010) and Remund (2010). To structure the subsequent review of the literature measuring FL in the university student context, a research synthesis approach (Cooper, 2017) was utilised: the detailed research synthesis (problem formulation, literature search approach, criteria for the inclusion of studies, and assessment evaluation criteria) as well as in-depth quantitative findings are summarised in Appendix B with the salient findings elaborated in the subsequent sections. Relevant studies published subsequently to the research synthesis time frame were also reviewed; however, they are not included in the quantitative synthesis results.

2.5.2 Financial Literacy Research Synthesis

The terms FL, financial knowledge, and financial education are often used interchangeably in the literature and popular media (Huston, 2010), complicating the comparison of research approaches and findings. To develop a detailed understanding, it is essential initially to provide a clear definition of FL as well as the subject areas that it covers. An analysis of 71 studies on FL[3] finds that 72% of studies do not include a clear definition of FL and 47% of studies analyse

[3] Published between 1996 and 2008

the terms FL and financial knowledge synonymously (Huston, 2010). This lack of consistency in defining the construct of FL is also noted by Hung et al. (2009), stating that "FL has been variably defined as (a) a specific form of knowledge, (b) the ability or skills to apply that knowledge, (c) perceived knowledge, (d) good financial behaviour, and even (e) financial experiences". Furthermore, researchers often fail to distinguish FL from related concepts, such as numeracy, general knowledge, decision-making competence, or general cognitive abilities (Hung et al., 2009).

2.5.2.1 FL Dimensions

More recent research suggests that FL definitions have become more multidimensional and increasingly also include "behaviour" (or "decisions") or "attitudes" (or "values") as distinct construct components. Based on a review of 37 data sets defining the measurement of university students' FL, four distinct dimensions of FL (see Appendix B) are frequently utilised as FL construct components.

Objective Financial Knowledge ("OK")

According to Huston (2010), FL comprises a knowledge dimension ("financial knowledge"), encompassing the stock of actual ("objective") knowledge of personal finance concepts and products acquired through education and/or experience. Consequently, OK represents what somebody actually knows about financial concepts (Allgood & Walstad, 2016). In consumer research, OK is defined as the accurate stored information that a consumer possesses (Carlson, Vincent, Hardesty, & Bearden, 2009). As outlined in the previous section, Huston (2010) finds that 47% of FL studies published between 1996 and 2008 use the term "financial knowledge" synonymously with "FL", suggesting equivalence between these term. The corresponding number declines to 30% for the studies examined in the context of this review, indicating an increasing trend to employ a more sophisticated (multidimensional) FL construct. Nevertheless, all the studies reviewed (see Appendix B) include OK as the basic FL construct building block.

Subjective Financial Knowledge ("SK")

Consumer research distinguishes between consumers' actual knowledge (i.e. OK) and their subjective knowledge self-assessment (Alba & Hutchinson, 2000; Hadar et al., 2013). SK comprises how somebody perceives and self-assesses his or her own knowledge (Allgood & Walstad, 2016; Carlson et al., 2009; Hung et al., 2009). Huston (2010) refers to this dimension as an application dimension, that is, the ability and confidence to apply or use OK for the purpose of financial decision making. Allgood and Walstad (2016) suggest that SK is not simply another measure of OK but a distinct construct that may affect financial behaviour. The

distinction between OK and SK in consumer decision making is a well-researched phenomenon in consumer and marketing research (Alba & Hutchinson, 2000; Allgood & Walstad, 2016; Carlson et al., 2009; Hadar et al., 2013), suggesting that the correlation between OK and SK varies substantially across studies and in some instances yields no significant relationship (Carlson et al., 2009). In the FL context, SK may measure financial confidence, so a person with high SK and low OK literacy may be thought of as over-confident (Allgood & Walstad, 2016). In that context, Hadar et al. (2013) point out that it is important to distinguish between confidence in one's knowledge (a manifestation of SK) and confidence in one's decisions (a consequence of SK and ultimately a manifestation of financial behaviour). The related concept of "self-efficacy" found in the literature, which is defined as "a person's own judgment to perform a certain activity in order to attain a certain outcome" (Al-Bahrani, Buser, & Patel, 2020; Zulkosky, 2009) is considered to be aligned with the concept of SK and subsumed as SK.

Financial Behaviour ("FB")

The objective of FL is to achieve sound consumer financial behaviour and thus exert a positive impact on financial well-being. Consequently, some researchers seek to capture evidence of behaviour within an FL measure and even deem it to be the most important dimension of FL (Atkinson & Messy, 2012; Pintye & Kiss, 2016). Overall, the objective of FB is to make informed and well-reasoned economic and financial decisions (Mandell & Klein, 2009; Rosacker & Rosacker, 2016). The specific financial behaviours assessed may include instances such as thinking before making a purchase, paying bills on time, managing one's own finances and budgeting, saving, and reasonable incurrence of debt (Atkinson & Messy, 2012; Bongini, Trivellato, & Zenga, 2012; Hadzic & Poturak, 2014; Rosacker & Rosacker, 2016).

Financial Attitude ("FA")

Financial attitude can be understood as the normative, value-based, and attitudinal components of behaviour (Luksander et al., 2014). FA may alternatively be referred to as "values" (Cull & Whitton, 2011) or "perceptions" (Hadzic & Poturak, 2014). Researchers who include FA as part of the FL construct posit that, if consumers have a negative (positive) attitude towards recommended behaviour, they will be less (more) inclined to undertake such behaviour (Atkinson & Messy, 2012). Assessed attitudes may include planning for the future (Atkinson & Messy, 2012; Çelikkol & Çelikkol, 2015; Pintye & Kiss, 2016), spending and saving habits (Atkinson & Messy, 2012; Çelikkol & Çelikkol, 2015; Hadzic & Poturak, 2014; Pintye & Kiss, 2016), investment preferences (Çelikkol & Çelikkol, 2015), safety of credit card use (Hadzic & Poturak, 2014), and financial risk tolerance (Lorence, Lawrence, Salsbury, &

Goertz, 2014; Nano & Cani, 2013). Since FA depends on the concrete situation of what kind of behaviour leads to consequences that are beneficial (or detrimental) to the individual, measurement frequently occurs in terms of agreement or disagreement with attitude statements (Atkinson & Messy, 2012; Luksander et al., 2014). In this specific dimension, it might therefore be misleading to draw conclusions in terms of a high or low level of FL (Luksander et al., 2014).

2.5.2.2 Construct Definition

As outlined in section 2.5.2.1 above and to the extent that FL constructs are clearly defined in studies, most FL definitions are composed of all or some of these four distinct dimensions. However, as no standardised definition and measure of FL (Fernandes et al., 2014; Huston, 2010; Remund, 2010) have evolved yet, researchers utilise a wide range of differing definitions. In the following paragraphs, the FL definitions used in a sample of studies (see Appendix B) are reviewed, applying the distinct dimensions as criteria.

One-Dimensional FL Definitions

One-dimensional FL constructs represent the most basic form of definitions and utilise the terms FL and OK synonymously. Huston (2010) reports that 47% of studies reviewed that define FL meet this criterion while the corresponding number declines to 30% for the studies examined in this literature review (see Table 3 and Appendix B).

Table 3 – One-Dimensional FL Definitions

Study	OK	SK	FB	FA	Definition of FL Provided
One Dimensional: FL = Objective (Financial) Knowledge					
Akben-Selcuk and Altiok-Yilmaz (2014)	X				"… the focus was financial knowledge because it is more readily measured and well defined"
Al-Tamimi and Bin Kalli (2009)	X				…"objective measures were used to assess the FL level" …
Amari and Jarboui (2015)	X				"we understand FL as the level of financial knowledge"
Kindle (2013)	X				When FL is explicitly defined by US government organisations, the definition tends to be "FL is the ability to use knowledge and skills to manage financial resources effectively for a lifetime of financial well-being". Consistent with the American understanding of FL, this study attempts to assess the existing level of objective financial knowledge among social work students.
Shambare and Rugimbana (2012)	X				"For the purposes of this study, financial illiteracy is regarded as the inability to understand as well as the lack of basic financial skills and knowledge to function independently where financial transactions are concerned and in a way that consistently improves one's financial position."

Two-Dimensional FL Definitions

Two-dimensional FL definitions generally consider the two knowledge dimensions OK and SK (see Table 4 and Appendix B). Exceptions with differing two-dimensional approaches are rare and include combining OK with FB (Bongini et al., 2012) and OK with FA (Marriott, Pogue, & Osgerby, 2010).[4] Research (Hung et al., 2009; Huston, 2010; Remund, 2010) that focuses specifically on the conceptual FL definition (see Table 4) proposes a two-dimensional approach to FL consistent with the distinction between OK and SK, in which FL can be defined as comprising two dimensions: a *knowledge* dimension ("OK") comprising the stock of actual ("objective") knowledge of personal finance concepts and products acquired through education and/or experience (Huston, 2010) and an application dimension that emphasises the ability and confidence to apply that knowledge (i.e. SK). The results of FL studies (Allgood & Walstad, 2016; Hadar et al., 2013) as well as non-finance consumer research (Alba &

[4] Both studies do not clearly state an FL definition, but the dimensions are deduced from the research design.

Hutchinson, 2000; Carlson et al., 2009; Devlin, 2006) suggest that the distinction between OK and SK and their interaction might be important to understand the resulting behaviour.

Table 4 – FL Definitions in Conceptual Studies

Study	OK	SK	FB	FA	Definition of FL Provided
Remund (2010)	X	X			FL is a measure of the degree to which one **understands** key financial concepts and possesses the **ability and confidence** to manage personal finances through appropriate, short-term decision making and sound, long-range financial planning while being mindful of life events and changing economic conditions.
Huston (2010)	X	X			FL could be conceptualised as having two dimensions: • **Knowledge** dimension: stock of knowledge acquired through education and/or experience specifically related to essential personal finance concepts and products. • Application dimension: **Ability and confidence** to apply or use effectively knowledge related to personal finance concepts and products.
Hung et al. (2009)	X	X			FL: **Knowledge** of basic economic and financial concepts as well as the **ability** to use that knowledge and other financial skills to manage financial resources effectively for a lifetime of financial well-being.

Similarly, the OECD has adopted a two-dimensional definition of FL for the purpose of the European PISA studies:

FL is knowledge and understanding of financial concepts and risks, and the skills, motivation and confidence to apply such knowledge and understanding in order to make effective decisions across a range of financial contexts, to improve the financial well-being of individuals and society, and to enable participation in economic life. (OECD, 2012, 2017)

This contrasts an earlier OECD definition that included FA and FB as distinct dimensions of FL but did not include SK (Atkinson & Messy, 2012).

Table 5 – Two-Dimensional FL Definitions

Study	OK	SK	FB	FA	Definition of FL Provided
Two-Dimensional: OK + SK					
Karaa and Kuğu (2016)	X	X			FL is the combination of consumers'/investors' understanding of financial products and concepts and their ability and confidence to appreciate financial risks and opportunities, to make informed choices, to know where to go for help, and to take other effective actions to improve their financial well-being.
Kołodziej (2014)	X	X			Analogically, the term FL can be conceptualised as having two dimensions: understanding (which refers to personal financial knowledge) and use (a personal finance application). In this context, FL implies that the person must have the ability and confidence to use his or her personal financial knowledge to make financial decisions (Huston, 2010).
Lee and Hanna (2014)	X	X			We will follow the practice of many previous researchers and focus on financial knowledge as a component of FL, although we realise that FL should include more than just financial knowledge. To ascertain the pathways of financial knowledge, this study classifies financial knowledge into subjective knowledge and objective knowledge …
Özdemir et al. (2015)	X	X			Individuals' financial knowledge and the ability to use this knowledge
Sarigül (2014)	X	X			FL is a basic concept in understanding money and its use in daily life. … The other component of FL is the skill to utilise knowledge and understanding to make beneficial financial decisions.
Tóth, Lančarič, and Savov (2015)	X	X			We can define FL as "the ability to use knowledge and skills to manage one's financial resources effectively for lifetime financial security" (Hastings et al., 2012).
Wagland and Taylor (2009)	X	X			"The broader definition of FL for this study is defined as: 1. Knowledge of personal financial is a basic concept in understanding money and its use in daily living … 2. The understanding of financial terms and concepts includes an understanding of key financial concepts central to investing and managing funds to increase wealth and security … 3. The third component of the definition is the skill to utilize knowledge and understanding to make beneficial financial decisions."
Xiao, Ahn, Serido, and Shim (2014)	X	X			FL is measured by both subjective and objective knowledge.

Multidimensional FL Definitions

Research suggests that FL definitions have become increasingly multidimensional and also include “behaviour” (or “decisions”) or “attitudes” (or “values”) as distinct construct components. In particular, an OECD study (Atkinson & Messy, 2012) based on a survey instrument developed by the OECD International Network on Financial Education and utilised in 14 countries proposes a three-dimensional FL construct:

FL is a combination of awareness, knowledge, skill, attitude and behaviour necessary to make sound financial decisions and ultimately achieve individual financial wellbeing. (Atkinson & Messy, 2012, p. 14)

Consequently, the study includes OK, FB, and FA but – although awareness and skill are specifically included in the working definition – does not consider SK as a distinct dimension from OK. This study influenced other researchers to adopt the same definition (Çelikkol & Çelikkol, 2015; Pintye & Kiss, 2016) or a definition covering those three dimensions (Nano & Cani, 2013; Nano & Polo, 2016). In addition, further iterations of multidimensional FL constructs can be identified (see Table 6). The key difference from the two-dimensional constructs is that these multidimensional constructs include at least one behavioural and outcome-based dimension.

Table 6 – Multidimensional FL Definitions

Study	OK	SK	FB	FA	Definition of FL Provided
Three and Four Dimensional					
Çelikkol and Çelikkol (2015)	X		X	X	… FL is "a combination of awareness, information, skills, attitude and behaviours needed for strong financial decisions and thus personal wealth".
Cull and Whitton (2011)	X	X	X	X	… FL is "the application of knowledge, understanding, skills and values in … financial contexts and the related decisions that impact on self, others, the community and the environment".
Huzdik et al. (2014) Luksander et al. (2014)	X	X		X	(1) Financial knowledge, (2) financial competence and experience, (3) financial skills, and (4) financial awareness … we added (5) financial attitude … to the concept of FL.
Krechovská (2015)	X		X	X	"a set of knowledge, skills, and attitudes of a citizen necessary for ensuring his/her own financial well-being and the financial well-being of his/her family within the present society, and for his/her active involvement in the market of financial products and services. A financially literate citizen is familiar with the issues of money and prices, and is able to manage his/her personal and/or family budget responsibly, including the management of financial assets and liabilities in consideration of changing life situations."
Nano and Cani (2013) Nano and Polo (2016)	X		X	X	Three components of FL: financial behaviour, attitude, and knowledge.
Pintye and Kiss (2016)	X		X	X	"FL is a combination of awareness, knowledge, skill, attitude and behaviour necessary to make sound financial decisions and ultimately achieve individual financial wellbeing" (Atkinson & Messy, 2012).
Rahim, Rashid, and Hamed (2016)	X	X		X	Therefore, maintaining its close link with the general definition of FL, this study proposes the conceptual definition of Islamic FL as "the ability of a person to use financial knowledge, skill and attitude (OECD, 2012) in managing financial resources according to the Islamic teachings".

A descriptive statistical analysis of FL conceptualisations based on the research synthesis approach is included in Appendix B.

2.5.2.3 Instrument Content

FL studies commonly cover one or all of the following financial content domains (Huston, 2010):

- basic concepts

- borrowing and debt
- saving and investing
- protection (insurance products and risk management techniques)

Basic concepts generally seek to test OK about fundamental economic concepts such as interest rates and compounding, inflation, and risk diversification. In this context, a significant number of studies employ a set of three and, respectively, five questions[5] to measure OK[6]. These knowledge questions (frequently referred to as the Big Three and, respectively, Big Five questions) are widely adopted as foundational questions in FL surveys in the US and other countries (J. S. Hastings, Madrian, & Skimmyhorn, 2012). For a recent overview of large-panel FL studies utilising the "Big Three" and, respectively, "Big Five" OK questions, see Stolper and Walter (2017). Other researchers also include general money management knowledge (Bongini et al., 2012), that is, knowledge related to the day-to-day tasks deemed necessary to function in a modern society, such as questions related to apartment leasing, credit card usage (Altintas, 2011), employment, and banking and finance as well as general expenditure (Marriott et al., 2010) in basic concepts.

Borrowing and debt generally assess OK on the liability side. This area is particular relevant as, in recent years, households have experienced a dramatic increase in the range and complexity of credit products available to them accompanied by increased default, bankruptcy, and foreclosures (Cole et al., 2014). Consequently, OK questions revolve around issues such as credit cards, mortgages, sources of financing (Gerrans & Heaney, 2019) student loans (Kindle, 2013), and credit histories (Rosacker & Rosacker, 2016).

Saving and investing focus specifically on the subject area of personal investing and long-term wealth accumulation, that is, the asset side. Knowledge as well as attitudes and behaviour related to financial investment products and instruments include matters such as SMP, the risk and return characteristics of securities, and risk diversification (see for example Al-Tamimi & Bin Kalli, 2009; Altintas, 2011; Bateman et al., 2012; Kindle, 2013; van Rooij et al., 2011b) as well as saving vehicles and saving motivation and awareness (Altintas, 2011; Rosacker & Rosacker, 2016).

[5] Understanding interest rates and compounding, inflation, and risk diversification; the additional two questions relate to mortgages and bond pricing: see Hastings et al. (2012) for the detailed Big Three and, respectively, Big Five questions.
[6] These assessments are defined as FL assessments although they measure only objective knowledge; consequently, here they are referred to as financial knowledge questions.

The content domain *protection* deals primarily with knowledge and understanding of insurance products and risk management techniques to the extent that they are relevant to consumer household finance (Rosacker & Rosacker, 2016; Sarigül, 2014; Wagland & Taylor, 2009).

Most studies (88%) reviewed cover basic concepts. Furthermore, 62% of studies concern savings and investments while 56% focus on debt/borrowing. In contrast, insurance and protection concepts are included only in a quarter of the studies examined (26%). As outlined in section 2.5.2.2, many FL studies lack a clear construct definition. Consequently, the approach to measuring FL varies significantly in the literature reviewed and no single standardised approach emerges. In studies published since the 1990s, the measurement of FL and related concepts is predominantly conducted by means of surveys (J. S. Hastings et al., 2012). Huston (2010) finds that substantial variation exists in the number of questions employed to measure FL (minimum = 3, maximum = 68; mean, median, and mode between 10 and 16).

The mean number of instrument items used to measure financial knowledge is 19 in the studies reviewed (see Appendix B), representing a modest increase over the mean of 16 noted by Huston (2010). Nevertheless, this increase might be overstated as the literature review study selection focused on FL measurements in the university student context while Huston's examination includes several large-scale studies based on instruments utilising the Big Three or Big Five questions, thus potentially decreasing the mean value. Nevertheless, the result suggests an evolution in the comprehensiveness of instruments. According to Huston (2010), the specific number of instrument items primarily depends on adequate representation of each domain. A rule of thumb for the minimum number of items with meaningful loadings on a domain factor varies between three and five (Kim & Mueller, 1978, cited in Huston, 2010). Consequently, an estimate of the average number of items per content domain was made by dividing the number of items by the number of content domains examined. This estimate results in a mean of eight items per content domain, a result that appears to underscore further the evolution of instruments employed and aligns with the rule of thumb proposed by Kim and Mueller (1978). Applying the rule of thumb to the studies based on the Big Three and, respectively, Big Five questions suggests that these studies appear to be inadequate to provide a thorough measure of financial knowledge. Similarly, Hastings et al. (2012) conclude that there is no evidence that these Big Three or Big Five questions are the best or a superior approach to measuring FL. Only nine studies reviewed include a statement on the reliability measure for the instrument used. Nevertheless, it should be noted that the examination was limited to the specific papers and did not consider whether instruments are based on prior research and thus are potentially assessed for reliability in earlier studies.

2.5.2.4 Measurement Methods

The assessment of measurement methods focused on the research methodology employed, including the research design, sampling method, sample size, and response rate as well as the data analysis method (see Appendix B for details). A substantial variation in the number of samples obtained in the studies reviewed, with a mean of 752 and a median of 472, was noted. All the studies utilise a quantitative research approach predominantly employing a survey design (86%).[7] It was noticeable that nearly a quarter of the studies do not specifically cover all the FL dimensions as per the construct definition whereas a further quarter of studies do not specify the construct definition at all. Only about a third of the studies indicate that the sampling approach relies on probability methods, while 19% of the studies use non-probability (convenience) sampling. Furthermore, a high percentage of the studies do not provide relevant research design details pertaining to sample sizes, data collection methods, and sampling methods, thus making it difficult to evaluate the academic rigour of these study designs. A meta-analysis by Fernandes et al. (2014) similarly concludes that many papers do not provide enough methodological details.

2.5.2.5 Interpretation and Rating

Instrument scoring is the means of rating, communicating, and providing consistency in testing and interpreting results from an instrument (Huston, 2010). A clear and concise rating definition of FL appears to relevant, particularly as the question of what constitutes adequacy will most likely depend on the specific circumstances of the subjects being surveyed (Faulkner, 2015).

Only 22% of the studies examined include a definition of what is deemed to constitute "adequate" FL. This indicates a modest improvement over the 6% reported by Huston (2010). Ratings are defined as obtaining a certain percentage of correct answers to objective financial knowledge questions. The percentage required for adequate FL varies between a "pass" of 40% (Marriott et al., 2010) and a "medium" of 50% (Altintas, 2011) to 65% (Nano & Cani, 2013; Nano & Polo, 2016). It is noticeable that – despite the specific construct definition including additional dimensions apart from OK (see section 2.5.2.2) – the conclusion on FL levels appears to be based exclusively on the performance measure of OK.

To the extent that the dimensions "attitude" and "behaviour" are included in the construct definition, the measurement of these dimensions does not affect the FL rating, thus indicating an inconsistent measurement approach and instrument interpretation. The increased multidimensional sophistication in construct definition is consequently not applied consistently

[7] For a rare example of an FL study utilising a qualitative research design, see Bamforth et al. (2017).

to instrument operationalisation and interpretation. This finding supports Fernandes et al. (2014), who state that there is a marked disconnection between the conceptual definition of FL as a skill and form of expertise and the way in which it is operationalised as simply knowledge of financial facts. These findings are problematic: construct operationalisation as well as an interpretation model that is consistent with the underlying construct definition are of central importance to construct validity (Pedhazur & Schmelkin, 1991). In addition, a multidimensional FL construct would require a corresponding multidimensional interpretation model, thus greatly complicating the operationalisation (if a broad range of financial content domains is to be captured). This supports the idea of limiting the number of dimensions that an FL definition should encompass for it to be operationalised consistently.

2.5.3 Factors Predicting the Financial Literacy Levels of University Students

Research identifies several characteristics that appear to have predictive value for the level of university students' financial literacy. The sample of studies reviewed (see section 2.5.2 and Appendix B) was coded for these predictors and the descriptive results are outlined in the following table.

Table 7 – Research Synthesis Analysis: Predictors of Higher FL Levels

Higher FL is associated with:		Findings #				Percentage [1]		
		1	0	2	9	1	0	2
E.1	Male Gender	12	7	1	17	60%	35%	5%
E.2	Business students	10	1	2	24	77%	8%	15%
E.3	Age	9	4	0	24	69%	31%	0%
E.4	Education level / Years of Study(Class Rank)	13	1	0	25	93%	7%	0%
E.5	Experience	10	2	0	32	83%	17%	0%
E.6	Socialisation by parents	5	0	0	30	100%	0%	0%
E.7	education level of parents	5	2	0	30	71%	29%	0%
E.8	Deep learning approach	1	0	0	36	100%	0%	0%
E.9	Financial education (intervention)	10	0	0	27	100%	0%	0%
E.10	Other[2]							

Code	
1	Significant relationship
0	No finding / no significant relationship
2	Contrary Finding
9	Not Reported / Not Assessed

1) Percentage calculated only for results with Code 0, 1 or 2 (code 9 excluded)

2) Other includes:
race (caucasian) (3 studies); Income (2 studies); less dependence on family; better savings decisions; knowledge of financial products;

2.5.3.1 Gender

The evidence for a gender gap in FL, in terms of women being less literate than men, is overall inconclusive. While a number of studies focusing on university students as well as on a

broader sample find positive evidence to support this hypothesis, other studies do not reach a similar conclusion (see Table 8). Wagland and Taylor (2009) report that gender is not a significant factor for Australian students. Portuguese female students even show a higher level of financial knowledge than their male counterparts (Pires & Quelhas, 2015). A unique approach (Akben-Selcuk & Altiok-Yilmaz, 2014) measures students' learning approach by differentiating between a deep and a surface learning approach according to the Revised Two Factor Study Process Questionnaire developed by Biggs, Kember, and Leung (2001). The study finds that the gender difference between male and female students disappears when controlling for the learning approach: male students on average resort to a deep learning approach that is associated with higher financial literacy.

Table 8 – Predictor "Male Gender Associated with Higher Levels of FL"

Predictor "Male Gender Associated with Higher Levels of FL"	Significant Relationship	No Finding/No Significant Relationship	Contrary Finding
Studies focusing on university students	• Abdullah, Ab Wahab, Sabar, and Abu (2017) • Akben-Selcuk and Altiok-Yilmaz (2014) • Al-Bahrani et al. (2020) • Al-Tamimi and Bin Kalli (2009) • Aydin and Akben Selcuk (2019) • Bateman et al. (2012) • Douissa (2019) • Ergün (2018) • Gerrans and Heaney (2016) • Gok and Ozkale (2019) • Huzdik et al. (2014) • Luksander et al. (2014) • Krechovská (2015) • LaBorde, Mottner, & Whalley (2013) • Lee and Hanna (2014) • Oseifuah, Gyekye, and Formadi (2018) • Philippas and Avdoulas (2020) • Popovich, Loibl, Zirkle, and Whittington (2020)	• Altintas (2011) • Cull and Whitton (2011) • Kindle (2013) • Marriott et al. (2010) • Mudzingiri, Muteba Mwamba, and Keyser (2018) • Özdemir et al. (2015) • Rosacker and Rosacker (2016) • Wagland and Taylor (2009)	• Çelikkol and Çelikkol (2015) • Gavurova, Huculova, Kubak, and Cepel (2017)

Predictor "Male Gender Associated with Higher Levels of FL"	Significant Relationship	No Finding/No Significant Relationship	Contrary Finding
	• Robb & James III (2009) • Robb & Sharpe (2009) • Sarigül (2014) • Seyedian & Yi (2011) • Shambare and Rugimbana (2012)		
Additional studies	• Alessie, Bucher-Koenen, Lusardi, & van Rooij (2013) • Chen and Volpe (1998) • Lusardi et al. (2010) • Power, Hobbs, and Ober (2011)		• Pires and Quelhas (2015)

2.5.3.2 University Study Subject

As should be expected, students in the field of business and finance frequently exhibit a better understanding of financial concepts than non-business students (see Table 9). Nevertheless, while business students are found to be more prepared, knowledgeable, and motivated to plan and save for retirement than non-business students, neither group has a high level of understanding of how to use financial services products (Power, Hobbs, & Ober, 2011).

Table 9 – Predictor "Business Studies Associated with Higher Levels of FL"

Predictor "Business Studies Associated with Higher Levels of FL"	Significant Relationship	No Finding/No Significant Relationship	Contrary Finding
Studies focusing on university students	• Çelikkol and Çelikkol (2015) • Douissa (2019) • Ergün (2018) • Gerrans and Heaney (2016) • Huzdik et al. (2014) • Luksander et al. (2014) • Karaa and Kuğu (2016) • Krechovská (2015) • LaBorde et al. (2013) • Özdemir et al. (2015) • Robb and James III (2009) • Robb and Sharpe (2009) • Sarigül (2014) • Tóth et al. (2015)	• Pintye and Kiss (2016)	• Altintas (2011) • Cull and Whitton (2011)
Additional studies	• Power et al. (2011) • Chen and Volpe (1998)		

2.5.3.3 Age, Education Level, and Experience

Chen and Volpe (2002) find that the level of financial knowledge is positively related to age and work experience.[8] This finding is confirmed both in the Turkish context (Akben-Selcuk & Altiok-Yilmaz, 2014) and in the Malaysian context (Sabri, MacDonald, Hira, & Masud, 2010). Older students and students with lower income, respectively, who are less supported by their family have more advanced knowledge of financial concepts (Luksander et al., 2014) as by necessity these students must deal more intensively with personal finance matters. These findings are confirmed by the results of the research synthesis (see Table 7 and Table 10) as the majority of studies confirm positive associations between higher age and experience and a higher level of FL. Similarly, students who are more advanced in their studies exhibit higher FL; it can be argued that these students are on average both older and more experienced in

[8] Older students and those with greater work experience are found to exhibit a higher degree of financial knowledge.

dealing with personal finance matters. Consequently, among higher-education students, the education level (years of study) can be seen as a proxy for age and experience.

Table 10 – Predictor "Age, Experience, and Education Level Associated with Higher Levels of FL"

Predictor	Significant Relationship	No Finding/No Significant Relationship
Age	• Akben-Selcuk and Altiok-Yilmaz (2014) • Altintas (2011) • Aydin and Akben Selcuk (2019) • Bateman et al. (2012) • Eitel & Martin, (2009) • Gerrans and Heaney (2016) • Gok and Ozkale (2019) • Huzdik et al. (2014) • Luksander et al. (2014) • Karaa and Kuğu (2016) • Kindle (2013) • LaBorde et al. (2013)	• Al-Tamimi and Bin Kalli (2009) • Çelikkol and Çelikkol (2015) • Cull and Whitton (2011) • Wagland and Taylor (2009)
Education level	• Al-Tamimi and Bin Kalli (2009) • Altintas (2011) • Aydin and Akben Selcuk (2019) • Bateman et al. (2012) • Eitel and Martin (2009) • Ergün (2018) • Gok and Ozkale (2019) • Karaa and Kuğu (2016) • Kindle (2013) • Krechovská (2015) • LaBorde et al. (2013) • Nano and Cani (2013) • Nano and Polo (2016) • Sarigül (2014) • Shambare and Rugimbana (2012) • Shim, Barber, Card, Xiao, & Serido (2010) • Tóth et al. (2015) • Xiao et al. (2014)	• Cull and Whitton (2011)
Experience	• Akben-Selcuk and Altiok-Yilmaz (2014) • Al-Tamimi and Bin Kalli (2009) • Cull and Whitton (2011) • Gok and Ozkale (2019)	• Huzdik et al. (2014) • Luksander et al. (2014) • Wagland and Taylor (2009)

Predictor	Significant Relationship	No Finding/No Significant Relationship
	• Heckman & Grable (2011) • Kindle (2013) • Marriott et al. (2010) • Oseifuah et al. (2018) • Robb and James III (2009) • Robb and Sharpe (2009) • Sabri et al. (2010) • Sarigül (2014) • Seyedian and Yi (2011)	

2.5.3.4 Teaching/Socialisation by Parents

Parents' level of education is a strong determinant of their children's FL (Lusardi et al., 2010; see Table 11). Further, discussing family finances (Sabri et al., 2010) and financial socialisation by parents (Akben-Selcuk & Altiok-Yilmaz, 2014) appear to have a positive influence, while in contrast family income in certain instances does (Douissa, 2019; Oseifuah et al., 2018) and in other instances does not turn out to be a significant predictor of FL (Akben-Selcuk & Altiok-Yilmaz, 2014).

Table 11 – Predictor "Education Level of and Socialisation by Parents Associated with Higher Levels of FL"

Predictor	Significant Relationship	No Finding / No Significant Relationship
Education level of parents	• Akben-Selcuk and Altiok-Yilmaz (2014) • Al-Tamimi and Bin Kalli (2009) • Altintas (2011) • Huzdik et al. (2014) • Luksander et al. (2014) • Philippas and Avdoulas (2020) • Sarigül (2014)	• Çelikkol and Çelikkol (2015) • Karaa and Kuğu (2016)
Socialisation by parents	• Afsar, Chaudhary, Iqbal, and Aamir (2018) • Akben-Selcuk and Altiok-Yilmaz (2014) • Altintas (2011) • Gerrans and Heaney (2016) • Huzdik et al. (2014) • Luksander et al. (2014) • Sabri et al. (2010)	

2.5.4 Summary and Research Operationalisation

The results of the examinations in sections 2.5.2.2 (FL Construct), 2.5.2.3 (Instrument Content), 2.5.2.4 (Measurement Methods), and 2.5.2.5 (Interpretation and Rating) suggest that research partially tackles the issues raised by Huston (2010) by providing explicit construct definitions. Furthermore, measurement instruments have become more complex when measured in relation to the number of questions as well as the average number of questions per content domain. Nevertheless, the last barrier – instrument interpretation – is generally not addressed as most papers fail to define succinctly what constitutes "adequate FL". In addition, the examination supports Fernandes et al.'s (2014) finding that there is a marked disconnection between the conceptual definition of FL and the way in which it is operationalised. Overall, the results lead to the conclusion that the barriers to developing a standardised approach to measuring consumer FL have not been overcome and there is no alignment towards a standardised approach to measure FL as construct definitions have fragmented into more complex, multidimensional constructs while operationalisation in terms of measurement and interpretation has not kept pace with more sophisticated construct definitions.

Based on these results, the operationalisation of the FL construct for the present research was determined: a two-dimensional approach to FL comprising objective and subjective (perceived) financial knowledge remains the most promising approach to a standardised FL definition as recent FL studies (Allgood & Walstad, 2016; Hadar et al., 2013) grounded in consumer research (Carlson et al., 2009) highlight that the distinction between OK and SK as well as the interaction of those dimensions might be important to understand resulting financial behaviour. Consequently, for the research, a two-dimensional definition comprising OK and SK as distinct dimensions of FL was deemed to be the most practical and relevant (see sections 3.2.2.2.1 and 3.2.2.2.2). Therefore, for the purpose of this research study , Financial Literacy (FL) is defined along two distinct dimensions as outlined in Table 12:

Table 12 - Definition of Financial Literacy within this Research Study

Dimension	Definition	References
Subjective Financial Knowledge (SK)	Respondent's perception (self-assessment) to the degree to which they are capable of performing a financial behaviour (FB).	Sections 2.5.2 and 3.2.2.2.1
Objective Financial Knowledge (OK)	Respondent's stock of objective knowledge specifically related to essential personal finance concepts (SMP in the context of this research study).	Sections 2.5.2 and 3.2.2.2.2

Source: adapted from Allgood & Walstad (2016; Fishbein & Ajzen (2010); Huston (2010)

Nevertheless, the importance of predictor variables beyond FL has been clearly established (see section 2.4.4). The research needs to integrate the investigation of SMP and FL into a theoretical framework that also systematically considers factors such as character-based variables as well as the potential impact of social norms. Consequently, the following chapter (section 3.2.1) will introduce the RAA framework and review its appropriateness, empirical evidence, and relevance to research in the SMP context.

2.6 Implications of the Literature Review

Since being initially addressed by Haliassos and Bertaut in 1995, the SMPP has received considerable research attention, as outlined in section 2.4. Nevertheless, existing SMP research studies frequently draw data from large-scale consumer surveys conducted with a broad and mature population sample or utilise survey data geared towards mature respondents or even respondents nearing retirement (see Table 13 for an overview of the relevant studies). Halko et al. (2012) analyse the gender effect on risky asset holdings in the Finnish context, including a sub-sample of university students (N = 77) in the overall sample (N = 335). However, the analysis in that study (Halko et al., 2012) is predominantly performed on the total sample and not specifically on the student sub-sample. No specific research on the relationship of SMP and younger adults and, respectively, university students has been identified, indicating a potential gap in the literature. However, understanding the factors influencing FL, SMP, or SMP intention is important for a young adult focus group such as university students: the university stage is arguably the last stage of formal education for students to acquire relevant financial knowledge prior to becoming adults (Jobst, 2012). Consequently, this suggests that financial knowledge (both OK and SK) and attitudes as well as the behavioural intentions shaped at this level might also be a significant factor in determining how young adults approach financial decision making, such as SMP, once they enter professional life. Lusardi et al. (2015), applying a stochastic life cycle model, estimate that 30 to 40% of wealth inequality can be explained by differences in financial knowledge as consumers are already required to make complex financial decisions at a young age and sub-optimal financial decision making early in life due to inadequate FL can be costly in the long run (Lusardi et al., 2010). As outlined in section 2.4.2, the economic importance of SMP suggests considerable consumption losses for those who refrain from participation and, particularly in the German context, low SMP rates represent economically costly and sub-optimal decisions. In contrast to specific SMP studies on university students, a large volume of research analyses the FL of university students; however, these studies frequently suffer from an inconsistent study design and methodological shortcomings (see section 2.5.2).

Table 13 – Primary Research Data Sources of SMP Studies

Study Sample Focus	Relevant Studies
Primary research data based on large-scale consumer surveys representing a broad and mature population sample	Abreu and Mendes (2010); Almenberg and Save-Soderbergh (2011); Arrondel et al. (2015); Brown et al. (2008); Christiansen et al. (2008); Dimmock and Kouwenberg (2010); Dobni and Racine (2015, 2016); Eugster (2019); Guiso et al. (2008); Haliassos and Bertaut (1995); Hsiao and Tsai (2018); Lee and Veld-Merkoulova (2016); Liu et al. (2014); Pan et al. (2020); Vaarmets, Liivamägi, and Talpsepp (2019); van Rooij et al. (2011b); Xia, Wang, and Li (2014); Yuan (2019)
Primary research data focused on mature respondents	Arora and Kumari (2015); Sivaramakrishnan et al. (2017); Vohra and Kaur (2016)
Primary research data focused on respondents nearing retirement	Christelis et al. (2013); Christelis, Georgarakos, and Sanz-de-Galdeano (2020); Hong et al. (2004); Jappelli and Padula (2015); Thomas and Spataro (2018); Yoong (2011)

Furthermore, in a comprehensive meta-analysis of 168 papers covering 201 non-redundant studies, Fernandes et al. (2014) argue that correlational studies that measure FL find positive associations with FB. However, based on empirical studies, Fernandes et al. (2014) find that the FL effects on FB diminish dramatically when controlling for the effects of psychological traits that are omitted in prior research. This study sought to contribute to knowledge through a focused analysis of SMP behavioural intention of undergraduate students at a German university, thus addressing the issue that the SMPP is not well understood from the German perspective (Stolper & Walter, 2017). Furthermore, the study applied a proven social psychology framework (RAA) for the prediction of BI and ultimately FB (see section 3.2.1), addressing criticism that prior FL studies overlook the effects of psychological traits on FB (Fernandes et al., 2014). The importance of psychological characteristics – besides FL – for SMP is clearly established in the literature both by observation (see sections 2.4.4.4 and 2.4.4.5) and in the theories promulgated to explain the SMPP (see section 2.4.5). Simultaneously, prior FL research on university students does not tackle these matters convincingly, as evidenced by the inconsistency of multidimensional FL constructs with the actual assessment and rating models (see section 2.5.2). This research aims to address these issues and to contribute to the literature by focusing on a university student population at a German university. Furthermore, in this research study FL is measured along two distinct dimensions (OK and SK) applying the definition outlined in Table 12. Addressing the criticism that prior studies omit psychological traits, this research study systematically applied the RAA, which is an integrative framework for the predictionof human social behaviour, originally developed by Martin Fishbein and Icek Ajzen. The TPB and RAA are utilised as a framework

for the prediction of social behaviour numerous times in other social psychology fields and are well supported by empirical evidence (see section 3.2.1). A comparable model considering the impact of social and psychological factors as well as FL on financial behaviour is developed by Tang et al. (2015). Nevertheless, based on the comprehensive empirical support for the efficacy of the RAA and TPB, the present research, focusing on analysing the factors exerting an impact on the SMP intention of undergraduate students of a German University, applied the RAA as promulgated by Fishbein and Ajzen (2010) as a theoretical framework. The RAA provides for the clear operationalisation of FL in two distinct measures (OK and SK), which are suggested to be important for the understanding of FL (Allgood & Walstad, 2016).

2.7 Summary

Chapter 2 reviewed the relevant literature on the SMPP as well as the FL of university students. While the literature on both subjects is comprehensive, a number of potential gaps in the knowledge base emerged.

The SMPP explanations provided (see section 2.4.5) all hold merit, yet no single explanation is able to address adequately all the related SMP observations (see sections 2.4.3 and 2.4.4). Consequently, research should focus on identifying when and which explanations are more relevant to which group of investors (Guiso & Sodini, 2012). However, the SMP research studies reviewed focus largely on broad and mature population samples or even elderly populations approaching retirement (see Table 13). Young adults, such as university students, are not addressed as a specific target group. Furthermore, the SMPP is generally not exhaustively researched from the German perspective (Stolper & Walter, 2017), despite a comparatively low German SMP rate and significant societal and economic implications in terms of German household net wealth decreases, partially attributed to low SMP (see section 2.4.2). This research seeks to address this gap in knowledge by focusing on students at a German university.

Further, the review of research focused on assessing FL – which is the observation most frequently associated with SMP – found that there is a disconnection between the definition and the measurement of FL, in particular when the FL definition is multidimensional (see section 2.5). Consequently, this research study defined FL in a two-dimensional way (see Table 12) comprising the distinct dimensions of OK and SK. Consumer research (Carlson et al., 2009) highlights that the distinction between OK and SK as well as the interaction of those dimensions might be important to understanding the resulting FBs, such as SMP.

Based on the implications of the literature review, Chapter 3 assesses the RAA as the underlying theoretical framework for this research, details the operationalisation of the

background, predictor, and outcome variables applying the RAA framework, posits testable hypotheses as well as sets out the research strategy.

3 Research Methodology

3.1 Introduction

The research problem and objectives have been discussed in Chapter 1, while the relevant literature and its implications for this research have been reviewed in Chapter 2. The following chapter outlines the process followed to develop testable hypotheses (section 3.2) and sets out the research strategy (section 3.3) that was adopted to test these hypotheses.

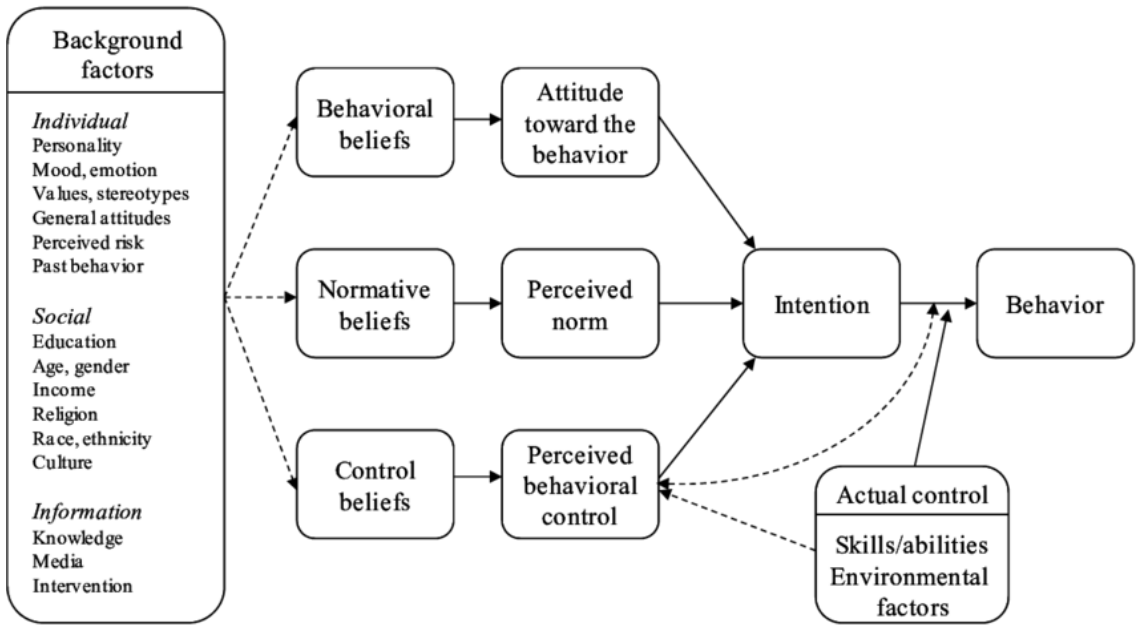
3.2 Hypothesis Development

3.2.1 Theoretical Framework

3.2.1.1 Introduction

The RAA is an integrative framework for the prediction of human social behaviour (see Table 14), originally developed by Martin Fishbein and Icek Ajzen following the earlier theory of reasoned action (TRA) and the theory of planned behaviour (TPB) (Fishbein & Ajzen, 2010). The RAA contends that the processes underlying all human social behaviour are essentially the same and consequently can be described by reference to a small set of constructs, namely that attitudes towards a behaviour (FA), perceived social norms (PSN), and perceived behavioural control (PBC) determine people's intentions (BI) while people's intentions ultimately serve to predict their behaviours (Fishbein & Ajzen, 2010).

Table 14 – Schematic Presentation of the Reasoned Action Approach



Source: Fishbein and Ajzen (2010, p. 22)

3.2.1.2 General Application and Empirical Evidence

The RAA and its predecessors are applied in a multitude of different settings and with many different behaviours, including but not limited to health-related behaviours, sustainable behaviours, traffic behaviours, organisational behaviours, political behaviours, and discriminatory behaviours. The predictive value of the RAA and TPB is strongly supported by empirical evidence, as a number of meta-analyses indicate (see Table 15).

Table 15 – Overview of Meta-Analyses Covering the TPB and RAA

Study	Studies Covered	Scope of Behaviours	Conclusion
Starfelt Sutton and White (2016)	38	Sun-protective intentions and behaviours	The review shows that the TPB explains a large amount of variance in sun protection and that TPB associations are robust across different populations.
McEachan et al. (2016)	86	Health behaviours	The paper indicates the potential value of the sub-components of the RAA in helping to understand the determinants of health behaviours. Although less parsimonious than the TPB, the RAA with its sub-components offers unique insights into the determinants of health behaviours. Experiential attitude, instrumental attitude, injunctive norm, descriptive norm, and capacity emerge as consistent predictors of intention, while intention, capacity, experiential attitude, and descriptive norm emerge as predictors of behaviour.
Hausenblas and Carron (1997)	31	Exercising behaviour	The results provide strong general support for the validity of the TRA and TPB.
Gao, Mattila, and Lee (2016)	26	Environment-friendly initiatives in hospitality	The findings of this research suggest that the positive relationship between consumer perceptions and behavioural intentions is well established.
Godin and Kok (1996)	56	Health-related behaviours	The averaged R-squares for intention and behaviour are 0.41 and 0.34, respectively. Intention is the most important variable to predict behaviour as 66.2% of the explained variance in health-related behaviours is attributed to intention.
Cooke and French (2008)	33	Medical screening	Across the studies as a whole, attitudes have a large relationship with intention while subjective norms and perceived behavioural control (PBC) possess medium-sized relationships with intention.
Sheeran and Taylor (1999)	67	Condom use	Evidence suggests that perceived behavioural control from the theory of planned behaviour is a reliable predictor of behavioural intentions and explained variance over and above the effects of attitudes and subjective norms.

Study	Studies Covered	Scope of Behaviours	Conclusion
Plotnikoff, Costigan, Karunamuni, and Lubans (2013)	23	Physical activity in adolescents	The meta-analysis reveals that 48% and 33% of the variance, respectively, for intention and PA are explained by social cognitive models. Intention consistently emerges as the strongest construct associated with PA behaviour; however, the strongest construct associated with PA intention varies between studies and theories.
Tyson, Covey, and Rosenthal, (2014)	32	Heterosexual risk behaviours	The TPB provides a valuable framework for designing interventions to change heterosexual risk behaviours. However, the effect sizes vary quite substantially between studies, and further research is needed to explore the reasons.
Sheppard, Hartwick, and Warshaw (1988)	174	Health-related behaviour, voting behaviour, consumption behaviour	The model performs extremely well in the prediction of goals and in the prediction of activities involving an explicit choice among alternatives. Thus, it would seem that the Fishbein and Ajzen model has strong predictive utility even when utilised to investigate situations and activities that do not fall within the boundary conditions originally specified for the model.

In a meta-analysis of 56 studies on a wide range of health-related behaviours, such as addictive (cigarettes, alcohol, drugs, and eating disorders), automobile-safety-related, exercising, HIV/AIDS-related, hygiene-related, and eating behaviours, Godin and Kok (1996) find that the average R-square for intention and behaviour is 0.41 and 0.34, respectively. Intention is the most important variable to predict behaviour as 66.2% of the explained variance in health-related behaviours is attributed to intention. The meta-analysis finds that health-related behaviours remain largely within one's personal motivation. However, for behavioural categories in which perceived behavioural control plays a more important role, this factor is as important as attitude for explaining intention and ultimately action. Godin and Kok (1996) conclude that the theory performs well across behavioural categories with respect to explaining intention. For the prediction of behaviour, however, its efficiency varies. A meta-analysis (Armitage & Conner, 2001) of 185 independent empirical tests of the TPB (the predecessor to the RAA) finds that, across all behaviours, the average multiple correlation of BI and PBC with behaviour is 0.52, accounting for 27% of the variance (R-square = 0.27), thus providing support for the TPB as a predictor of intention and behaviour. According to McEachan et al. (2011), the TPB as a model is applied to a wide range of behaviours due to the fact that it is clearly operationalised. Their meta-analysis covering 206 independent papers reporting 237 tests of the model with regard to health-related behaviours (including only prospective tests of behaviour) finds that the model explains 19.3% of the variance in

behaviour and 44.3% of the variation in intention (McEachan et al., 2011), demonstrating that the TPB is also useful for generating strong predictions of prospective behaviour.

McDermott and Sharma (2017), conducting a review based on 4 meta-analyses comprising 177 studies, caution that method bias significantly inflates associations in research examining the association between the TPB and health behaviour and poses a potentially validity threat to the findings reported in this field. The model of the RAA and its predecessors receive considerable attention, primarily in relation to consumer and health-related behaviours, as the overview in Table 15 indicates, and – despite concerns raised in the context of method bias – appear overall to predict intention and behaviour well. Furthermore, the model provides a comparatively simple basis for identifying where and how to target consumers' behavioural change attempts (Sheppard et al., 1988).

3.2.1.3 Application to FL and SMP

A number of empirical studies evaluating SMP and FL aspects employ the RAA or the TPB as their theoretical framework. Barbić, Lučić, and Chen (2019) employ the TPB to determine which factors have an impact on responsible financial consumption behaviours, which are defined in the context of the study as comprising spending self-control, planning for the future, information seeking, consumer education participation, consumer decision making, and solvency. For this study, FA is measured by three statements using a five-point Likert scale. PBC (SK) is measured using three items, while AC (OK) is measured by seven items; the dimension PSN is not included. Responsible financial consumption behaviours (as outlined above, comprising spending self-control, planning for the future, information seeking, consumer education participation, consumer decision making, and solvency) are measured by one intention item each. The study finds support for the hypotheses, indicating that FA, AC (OK), and PBC (SK) play an important role in explaining the outcome variable, responsible financial consumption behaviour, as all three variables are significantly and positively related to the outcome variable, with FA being the most significant factor (Barbić et al., 2019). Croy, Gerrans, and Speelman (2010) analyse a survey of 2300 Australian retirement savings fund members and their motivations to contribute more to savings and to manage their investment strategy actively. Utilising the TPB, the study concludes that respondents' FA, PSN, and PBC account for a large proportion of the variance in BI. The study further finds that respondents' risk tolerance adds little to the prediction of BI. In a similar context, Kimiyagahlam, Safari, and Mansori (2019) apply the TPB to identify the factors that have an effect on the retirement-planning behaviour of Malaysian adults. The study concludes that financial literacy, propensity to plan, and future orientation are directly associated with retirement-planning behaviour. However, family education and materialism are not associated with retirement planning. Studying the SMP intention of women in Indonesia, Mahastanti and Hariady (2014) utilise the

TPB for a sample of N = 50 to determine the factors affecting SMP decisions. The PSN is assessed based on items querying “People who are important to me think …” and does not take into account an assessment that the relevant important others (“referents”) need to be salient (compare section 3.2.2.2.3). FA to SMP are measured based on five sets of semantic differentials with a calculated average score. The study concludes that the intention to buy stocks is influenced by PBC and risk preference but is not affected by PSN and FA. Pascual-Ezama, Scandroglio, and Gil-Gomez de Liaño (2014) deem the TPB to be a good model for understanding individual Spanish investors’ behaviour (N = 127), resulting in 63% of BI and 48% of FB being explained by the regression model. As outlined in section 2.4.4.3, Sivaramakrishnan et al. (2017) study FL, SMP, and attitudinal factors in the Indian context and find that BI predicts actual investments in the stock market (FB). FL – both SK and OK – is also found to be a significant influencer on BI, while only OK seems to affect FB. Three variables – perception of regulator, risk avoidance, and the hassle factor – are combined with FA, which has a negative impact on BI, while the influence of PSN is not systematically assessed. The above studies implement variations of the TPB to assess FL and SMP, indicating support for the RAA/TPB as a valid approach to apply to the assessment of finance-related subjects, although the sample sizes obtained are comparatively small (Mahastanti & Hariady, 2014; Pascual-Ezama et al., 2014) and the measurement of PSN is not (Barbić et al., 2019; Sivaramakrishnan et al., 2017) or is only marginally (Mahastanti & Hariady, 2014) covered.

3.2.1.4 Summary and Implications

As outlined in sections 3.2.1.2 and 3.2.1.3, the RAA/TPB can be considered one of the most valid psychological models to study human behaviour (Pascual-Ezama et al., 2014) and is thus well suited to being employed as the theoretical foundation for this research project. Similar to the model proposed by Tang et al. (2015), the RAA can be considered to be a conceptual model that expands on Huston’s (2010) model, which stipulates that “other influences” are significant besides FL to predict FB, pointing out that “a person who is financially literate (i.e., has the knowledge and the ability to apply the knowledge) may not exhibit predicted behaviours because of these other influences” (Huston, 2010). Similarly, West (2012) conducts a case study examining the behaviour of highly literate investors against much less literate investors and finds that being financially literate does not necessarily mean demonstrating good FB. As such, the RAA dimensions PSN and FA complement SK and OK, thus operationalising Huston’s “other influences” in this research study. This approach also takes into consideration Fernandes et al.’s (2014) observation that FL’s effects on FB diminish when controlling for psychological traits. Consequently, the application of the RAA as the

theoretical framework is deemed to be appropriate and relevant. The detailed research operationalisation of the RAA framework is elaborated in the subsequent sections.

3.2.2 Variables

3.2.2.1 Overview

According to Dawis (1987), designing a scale requires a theoretical framework that includes a clear definition of the variables to be measured and indications of how it is to be measured: the definition of the variable depends on the larger theory that impels the research and includes distinctions of what the variable is and what it is not, dependencies regarding how the variable is a function of more basic or previously defined terms, and finally the way in which the variable is related to other variables (Dawis, 1987). In the following sections, the relevant RAA variables, their implications under the theoretical RAA framework in terms of construct definition and construct measurement, and the operationalisation for the research at hand are discussed. Based on Fishbein and Ajzen's (2010) RAA framework (see Table 14), the variables, as outlined in Table 16, are evaluated in detail. Section 3.2.2.2 outlines the theoretical implications as well as the research application for the RAA predictor variables AC/OK, PBC/SK, PSN, and FA, while section 3.2.2.3 considers the principal outcome variable BI. Section 3.2.2.4 concludes by providing an overview of the socio-demographic and character-based background variables.

Table 16 – Overview of the Relevant RAA Variables

Variable	Variable Type	Operationalisation as	Section Reference
Perceived behavioural control (PBC)	Predictor	Subjective financial knowledge (SK)	3.2.2.2.1
Actual control (AC)	Predictor	Objective financial knowledge (OK)	3.2.2.2.2
Perceived social norm (PSN)	Predictor	Injunctive and descriptive norms: peer, parental, and educational socialisation	3.2.2.2.3
Attitude towards behaviour (FA)	Predictor	Stock market image	3.2.2.2.4
Behavioural intention (BI)	Outcome	SMP intention	3.2.2.3
Socio-demographic	Background/ control	Age, nationality, gender, study subject, class rank, personal finance education, perceived FL of parents, educational level of parents, general experience, stock market experience	3.2.2.5
Character based	Background/ control	Disposition to trust, sociability, level of optimism, risk aversion	3.2.2.5.1

Source: Own illustration based on the RAA framework (Fishbein & Ajzen, 2010)

3.2.2.2 Predictor Variables

3.2.2.2.1 Perceived Behavioural Control – Subjective Financial Knowledge

3.2.2.2.1.1 Implications of the Theoretical Framework

The concept of sense of control, mastery, or perceived control plays an essential part in psychological well-being and human functioning and is a well-established theme in psychology (Fishbein & Ajzen, 2010; Rodin, 1989; Skinner, 1996; Thompson & Spacapan, 1991). A cumulative body of research demonstrates that the sense of control is clearly associated with positive outcomes, including health, achievement, optimism, persistence, motivation, coping, self-esteem, personal adjustment, and success and failure in a variety of life domains (Rodin, 1989; Skinner, 1996). However, despite the consistency of the findings, there is vast heterogeneity in construct definitions: the study by Skinner (1996) analyses more than a hundred different construct definitions and finds that one set centres on the term *control* while another set does not explicitly use the term control but is still closely related to the *control* set. According to Skinner (1996), the most fundamental distinction in the literature on control is between actual control (see section 2.5.2.1 on OK and SK in this context), or the objective control conditions present in the context and the person, and perceived control, or an individual's beliefs about how much control is available. The RAA defines PBC – in the context of subjective control – as "the extent to which people believe that they are capable of, or have control over, performing a given behaviour" (Fishbein & Ajzen, 2010, p. 155). PBC requires conceptualisation and assessment in accordance with the principles of compatibility such that it involves the same target, action context, and time elements as the behavioural criterion and can be measured by asking direct questions about the capability to perform a behaviour (Fishbein & Ajzen, 2010, p. 155 et seqq).

3.2.2.2.1.2 Application to the Research

The purpose of the research was to assess undergraduate students' intention to participate in the stock market (SMP). Therefore, in the two-dimensional FL construct context (see section 2.5), PBC is construed as corresponding to the self-assessment of SK, which is also frequently referred to as "perceived FL" (Allgood & Walstad, 2016). Consequently, the measurement of PBC conceptualised as SK was proposed to contain the following distinct elements:

- An indirect measure to assess the respondents' control beliefs regarding SMP based on the question formats suggested by Fishbein and Ajzen (2010, Chapter 5 and Appendix), requiring opinion statement-type agree–disagree answers on a seven-point unipolar scale. This measure corresponds to the concept of perceived autonomy of perceived behavioural control as outlined by Fishbein and Ajzen (2010, Chapter 5).

- A self-assessment of financial knowledge scored on a seven-point unipolar scale (*excellent knowledge–no knowledge*). The items are an expansion from Allgood and Walstad (2016), who only require an overall FK self-assessment; in the context of this research, the self-assessment was expanded to include distinct items to self-assess the knowledge related to stock markets and financial products as well as personal finance management.
- A direct measure based on a seven-point unipolar scale (*extremely comfortable–extremely uncomfortable*) based on the question formats suggested by Fishbein and Ajzen (2010, Chapter 5 and Appendix) to measure the degree of confidence that respondents feel with respect to engaging in financial behaviours in general and SMP specifically.
- Finally, a direct measure based on a five-point *absolutely sure–not at all sure* scale adapted from Christie and Etter (2005) to measure the degree of certainty that respondents feel concerning their prospects of success and the adequacy of their ability in the SMP context. This measure corresponds to the concept of *perceived capacity* of perceived behavioural control as outlined by Fishbein and Ajzen (2010, Chapter 5).

A comprehensive measure of PBC can be obtained by including items representing both perceived capacity and perceived autonomy (Fishbein & Ajzen, 2010). Consequently, a composite measure comprehensively combining the elements outlined above was computed as outlined in Table 17. The research operationalisation for PBC is summarised in Table 18, and the detailed instrument items for measurement are included in Appendix C.

Table 17 – Measurement Approach – PBC (SK)

Category	First-Level Measure	Second-Level Measure
Self-assessment of FK	Composite self-assessment score ("SCO_PBC_SelfAssess_Mean"): Calculating the mean across all self-assessment items (4 items, 7-point unipolar scale, see Q.7.3)	Composite perceived behavioural control score ("SCO_PBC_Sum_of_Mean"): Sum of all first-level measures
Control beliefs (perceived autonomy)	Composite control belief score ("SCO_PBC_Control_Mean"): Calculating the mean across all control belief statements (3 items, 7-point unipolar scale, see Q.7.2)	
Level of certainty and comfort (perceived capacity)	**Composite certainty score** ("SCO_PBC_Certainty_Mean"): Calculating the mean across all certainty statements (2 items, 7-point unipolar scale, see Q.7.5) **Composite comfort score** ("SCO_PBC_Comfort_Mean"): Calculating the mean across all comfort statements (3 items, 7-point unipolar scale, see Q.7.4)	

Table 18 – Research Operationalisation – Perceived Behavioural Control

RAA Variable	Perceived Behavioural Control		
RAA Definition	*"The extent to which people believe that they are capable of, or have control over, performing a given behaviour" (Fishbein & Ajzen, 2010, p.155)*		
Conceptualisation as SK	***Subjective Financial Knowledge*** *comprises how somebody perceives and self-assesses his own knowledge (Allgood & Walstad, 2016; Carlson et al., 2009; Hung et al., 2009).*		
Measurement Model	**Control beliefs** Please indicate how much you agree or disagree with each of the following statements: • Possess skills for SMP • Could invest successfully in Stock Market • Success in investing is up to me *Strongly agree – strongly disagree*	**Perceived Behaviour Control** How sure are you that: • success in investing in the stock market is in your control? • you have the required ability to invest successfully in the stock market? *Very sure – not at all sure*	**Assessment of Financial Knowledge (FK)** How would you assess your own financial knowledge concerning the following items: • Overall FK • FK to manage personal finances • FK concerning stock market • FK concerning financial products *Extremely adequate – Extremely inadequate (based on Allgood & Walstad, 2016)*
Scale	**Unipolar 7-point**	**Unipolar 5-point**	**Unipolar 7-point**

Source: Own adaptation considering Allgood and Walstad (2016); Carlson et al. (2009); Fishbein and Ajzen (2010); Hung et al. (2009)

3.2.2.2.2 Actual Control – Objective Financial Knowledge

3.2.2.2.2.1 Implications of the Theoretical Framework

Apart from assessing perceived behavioural control (section 3.2.2.2.1), it is necessary to obtain an assessment of people's actual control over their behaviour (Fishbein & Ajzen, 2010, p. 330). As the RAA is designed to be and is applied to a wide range of behaviours in different fields, there are no clear definitions and standard procedures for assessing actual control (Fishbein & Ajzen, 2010, p. 330) as the skills and abilities required for any given type of behaviour are not self-evident.

3.2.2.2.2.2 Application to the Research

The salient control factors established for perceived behavioural control can be employed as proxies for actual control (Fishbein & Ajzen, 2010, p. 330). In the context of the FL construct (see section 2.5), a two-dimensional FL construct comprising subjective (perceived) financial knowledge and objective (actual) financial knowledge was identified as the most promising approach. Therefore, and consistent with defining SK as PBC (section 3.2.2.2.1), actual control in the RAA context was defined as OK.

A wide range of FL and in particular OK measurement instruments exist in the literature (see section 2.5). Nevertheless, as it appears reasonable that the RAA principle of compatibility applies equally to the measurement of actual control to test for the knowledge and skills required for the specific behaviour (SMP) under investigation, the measurement instrument was based on an instrument developed by van Rooij et al. (2011b) for the purpose of assessing OK in the SMP context. The instrument contains five basic (BOK) and eleven advanced financial knowledge (AOK) questions covering financial subject matters as summarised in Table 19.

According to van Rooij et al. (2011b), the BOK questions measure the ability to perform simple calculations (in the first question), the understanding of how compound interest works (second question), and the effect of inflation (third question). Questions to assess the knowledge of time discounting (fourth question) and whether respondents suffer from money illusion (fifth question) are also included. These concepts form the basis of basic financial transactions, financial planning, and day-to-day financial decision making (van Rooij et al., 2011b). The eleven AOK questions are more complex, aiming to assess more advanced financial knowledge related to investment and portfolio choice (van Rooij et al., 2011b). Specifically, these questions assess respondents' actual knowledge of financial assets, such as stocks, bonds, and mutual funds; the returns and riskiness of different assets; and the workings of the stock market. In particular, this second set of advanced instruments meets the requirement of compatibility with relevant behaviour and SMP intentions in the RAA context as the skills and abilities tested need to be specific to the behaviour. Furthermore, the study by Knoll and Houts (2012) introduces a psychometrically developed, comprehensive index of the OK component of FL by applying the two-parameter item response theory (IRT) model to items that are frequently used in the assessment of FL. The most obvious benefit of IRT is that it takes item characteristics into account in obtaining ability estimates. IRT allows an assessment of both item difficulty and how closely the questions are actually related to the ability of interest (i.e. OK). Consequently, Knoll and Houts (2012) provide empirical support for the "goodness", or suitability, of several of the items most commonly used to measure financial knowledge and develop a 20-question scale that is to a significant extent also represented (see column IRT in Table 19 for questions that are included in the Knoll and Houts (2012) scale) in the instrument utilised for this research project. Comparing it with the instrument developed by van Rooij et al. (2011b), it can be noted that a significant number of questions (11) are also included in the Knoll and Houts (2012) 20-question scale. Only 2 items related to the SMP subject matter included in the 20-question scale are not part of the van Rooij et al. (2011b) instrument. Consequently, these 2 questions (see Instrument Nos. 17 and 18 in Table 19) are added to the instrument for the present research. All the remaining questions on the Knoll and

Houts (2012) 20-question scale are not related to the finance subject matter of interest and thus are not included in the final questionnaire (see Appendix C).

Table 19 – Research Operationalisation – Assessment of Objective Financial Knowledge

Instrument No. (Questionnaire No.)	Underlying Finance Concept	Answer Type	Big-Three Question[9]	IRT 20-Item Scale (Knoll & Houts, 2012)
Basic OK questions				
1 (Q.13.2)	Numeracy	Multiple choice	X	X
2 (Q.13.3)	Interest compounding	Multiple choice		X
3 (Q.13.4)	Inflation	Multiple choice	X	X
4 (Q.13.5)	Time value of money	Multiple choice		X
5 (Q.13.6)	Money illusion	Multiple choice		
Advanced OK questions				
6 (Q.13.7)	Stock market	Multiple choice		
7 (Q.13.8)	Stocks	Multiple choice		X
8 (Q.13.9)	Mutual funds I	Multiple choice		
9 (Q.13.10)	Bonds I	Multiple choice		X
10 (Q.13.11)	Asset return expectations	Multiple choice		X
11 (Q.13.12)	Asset risk expectations	Multiple choice		X
12 (Q.13.13)	Diversification	Multiple choice		X
13 (Q.13.14)	Bonds II	True/false		
14 (Q.13.15)	Risk of stocks vs. bonds	True/false		X
15 (Q.13.16)	Stocks vs. mutual funds	True/false	X	
16 (Q.13.17)	Bond prices	Multiple choice		X
Additional advanced OK questions based on the IRT 20-item scale (Knoll & Houts, 2012)				
17 (Q.13.18)	Mutual funds II	True/false		X
18 (Q.13.19)	Mutual funds III	True/false		X

Source: Own adaptation based on Knoll and Houts (2012); van Rooij et al. (2011b)

Furthermore, the instrument includes the "Big Three" questions (see Hastings et al., 2012) that are utilised in a large number of FL studies. For a recent overview of large-panel FL studies utilising the "Big Three" and, respectively, "Big Five" FL questions, see Stolper and Walter (2017). Consequently, the inclusion of this sub-set of OK questions will allow a wider comparison of OK measurement results with other studies. For the purpose of not unduly influencing the responses to other questions (in particular SK), the OK question block was placed near the end of the overall questionnaire. The detailed instrument items for the measurement of actual control (OK) are included in Appendix C.

[9] See Hastings et al. (2012) for the detailed Big Three questions.

For evaluation purposes, the OK assessment was based on the following sub-groups:

- Total OK (TOK) based on the assessment of all 18 items (see Table 19)
- Basic OK (BOK) based on the assessment of instruments 1 through 5 (see Table 19)
- OK (OK-3) based on the Big Three questions (see Table 19)
- Advanced OK (AOK) based on the assessment of instruments 6 through 18 (see Table 19)

The results of the AOK and TOK assessments are grouped according to the German grading system, applying the Reutlingen University Business School percentage scheme. Grades “sehr gut/excellent” to “befriedigend/satisfactory” are deemed to constitute adequate OK, whereas grades “ausreiched/sufficient” and “mangelhaft/insufficient” constitute inadequate OK. The grade “ausreichend/sufficient” is deemed to denote inadequate OK as, for practical application, achieving only 61% of the score is considered inadequate. The details of the OK assessment and grading scheme are outlined in Table 20 (TOK) and Table 21 (AOK). The BOK assessment, consisting of five items, was not graded but categorised as adequate or inadequate only, with zero to two correct answers denoting an “inadequate” assessment of BOK and three to five correct answers denoting an “adequate” assessment.

Table 20 – Assessment and Grading of Total Objective Financial Knowledge (TOK)

TOK Grading				
Reutlingen University Grading Percentages	**German Grading Descriptor**	**SPSS Coding**	**OK Score (max 18 points)**	**OK Assessment**
>91%	"sehr gut" (very good/ excellent: an outstanding achievement)	5	17 - 18	adequate
77%-91%	"gut" (good: an achievement that exceeds the average requirements considerably)	4	14 - 16	
62% - 76%	"befriedigend" (satisfactory: an achievement that fulfills average requirements)	3	12 - 13	
51%-61%	"ausreichend" (sufficient: an achievement that fulfills the requirements despite flaws)	2	10 - 11	Inadequate
0-50%	"mangelhaft" / "ungenügend" / "nicht bestanden" (insufficient / failed: an achievement that does not fulfil requirements due to major flaws)	1	0 - 9	

Table 21 – Assessment and Grading of Advanced Objective Financial Knowledge (AOK)

Advanced Financial Literacy Grading				
Reutlingen University Grading Percentages	**German Grading Descriptor**	**SPSS Coding**	**FL Score (max 13 points)**	**OK Assessment**
>91%	"sehr gut" (very good/ excellent: an outstanding achievement)	5	12 - 13	adequate
77%-91%	"gut" (good: an achievement that exceeds the average requirements considerably)	4	11	
62% - 76%	"befriedigend" (satisfactory: an achievement that fulfills average requirements)	3	9 - 10	
51%-61%	"ausreichend" (sufficient: an achievement that fulfills the requirements despite flaws)	2	7 - 8	Inadequate
0-50%	"mangelhaft" / "ungenügend" / "nicht bestanden" (insufficient / failed: an achievement that does not fulfil requirements due to major flaws)	1	0 - 6	

The adequacy assessment range was determined by the researcher and is in line with prior definitions of what adequate OK constitutes (see section 2.5.2.5). A recent research study (Ergün, 2018) similarly stipulates results below 60% of correct answers as a “low level of financial knowledge”. For the purpose of bi- and multivariate analysis (section 4.2), the effective OK scores will be utilized.

3.2.2.2.3 Perceived Social Norms

3.2.2.2.3.1 Implications of the Theoretical Framework

The social environment is considered to be a factor that can exert a strong influence – so-called social norms – on people’s intentions and actions. Research suggests that people in a peer group develop social norms for the preferred beliefs of the group (Baker & Nofsinger, 2002). Newcomers to the group discover these norms through interaction (i.e. “injunctive norms”; see the elaboration below) and by watching the actions of others (i.e. “descriptive norms”; see the elaboration below). Consequently, social norms refer to what is acceptable or permissible behaviour in a group or society (Fishbein & Ajzen, 2010, p. 129). Within the RAA, norms are defined as perceived social pressure to perform (or not to perform) a particular behaviour (Fishbein & Ajzen, 2010, p. 130).

Raven and French (1958) describe five bases of social power:

Reward power: Compliance with perceived social pressure because the person exerting the pressure is considered to have the power to reward desired behaviour.

Coercive power: Compliance with perceived social pressure because the person exerting the pressure is considered to have the ability to mediate punishments.

Legitimate power: Compliance with perceived social pressure because the person exerting the pressure is considered to have a legitimate right to prescribe behaviour.

Referent power: Compliance with perceived social pressure because of a sense of identification with the person exerting the pressure.

Expert power: Compliance with perceived social pressure because the person exerting the pressure is considered to have special knowledge or expertise.

Table 22 – Types of Perceived Norms and Relationship with Social Power Bases

Perceived Norm	**Definition**	**Potential Relationship with Bases of Social Power**				
		Reward	Coercive	Legitimate	Expert	Referent
Injunctive norm	• What is commonly approved and disapproved (Kallgren et al., 2000; Reno et al., 1993) • People may be motivated to behave in accordance with what they believe others think they should do in the context of a specific behaviour (Fishbein & Ajzen, 2010)	X	X	X	X	X
Descriptive norm	• What is commonly done (Kallgren et al., 2000; Reno et al., 1993) • People may be motivated to behave in accordance with what they believe others are doing in the context of a specific behaviour (Fishbein & Ajzen, 2010)				X	X

Source: Adapted from Fishbein and Ajzen (2010, p. 131); Raven and French (1958)

It is noticeable that, of these five bases, only reward and coercive power are accompanied by sanctions to encourage compliance or prevent non-compliance, whereas the other three bases do not use rewards or punishment to achieve compliance, which, according to Fishbein and Ajzen (2010, p. 130 f.) corresponds to the RAA to the extent that it is assumed that perceived social pressure can influence behaviour even when no rewards or punishments are

expected. Consequently, Fishbein and Ajzen (2010, p. 131) – based on the work of Kallgren et al. (2000; Reno et al., 1993) – define two distinct types of perceived norms, injunctive and descriptive, within the RAA.

Social norms and in particular the *relevant important others* ("referents") need to be salient. The RAA distinguishes between norms and normative beliefs, the difference being that the former involve a generalised social agent while the latter involve specific referent individuals (Fishbein & Ajzen, 2010, p. 134). To that extent, the RAA (Fishbein & Ajzen, 2010, p. 134 ff.) suggests that, in forming a norm (injunctive or descriptive), the normative prescriptions (injunctive norms) and, respectively, the observed behaviour (descriptive norms) of only salient referent individuals are taken into account as not every possible referent will be relevant to or important for a given behaviour. Consequently, in the context of an elicitation (pilot) study (see section 3.3.4.2.1), the salient normative referents need to be elicited by using a free-response format that is compatible with the underlying relevant behaviour (Fishbein & Ajzen, 2010, p. 135).

Injunctive Norms

For the purpose of measuring the impact of injunctive norms, it is important not only to ascertain the salient referents as well as their prescription regarding the relevant behaviour but also to determine whether a specific individual is motivated to comply with that referent (Fishbein & Ajzen, 2010, p. 137). This is particularly relevant to determine the overall impact of injunctive norms in instances in which the prescription differs between salient referents. Consequently, within the RAA, an injunctive norm N_I is based on the total set of salient injunctive normative beliefs n_i (i.e. salient referents) measured on a bipolar scale, each weighed by the motivation to comply with the referent m_i measured on a unipolar scale, as shown in Equation 1.

Equation 1 – Injunctive Norms

$$N_I \propto \sum n_i m_i$$

Source: Fishbein and Ajzen (2010, p. 137)

Although the measure of the injunctive normative belief needs to be behaviour specific (i.e. "What would the referent expect me to do in the circumstances of the specific behaviour in question"), motivation to comply should be measured on a general level as a second behaviour-specific question would be redundant (Fishbein & Ajzen, 2010, p. 138).

Descriptive Norms

The measurement of descriptive norms follows the measurement model of injunctive norms to the extent that it can also be based on assessing descriptive normative beliefs N_D of relevant salient referents D. Fishbein and Ajzen (2010, p. 144) argue that, for descriptive norms, it might be more appropriate to identify a suitable generalised social agent as it might not be appropriate or possible to perform the specific behaviour (e.g. the behaviour is gender related and can only be performed by a specific gender, such as "becoming pregnant") for salient important others. Further, Fishbein and Ajzen (2010, p. 148) suggest that measuring motivation to comply separately with regard to descriptive normative beliefs might do little to improve the prediction of the overall norm; consequently, the weighing of the normative belief by the motivation to comply m_d does not apply in this instance. The resulting approach to the measurement of descriptive norms is shown in Equation 2.

Equation 2 – Descriptive Norms

$$N_D \propto \sum n_d$$

Source: Own adaptation based on Fishbein and Ajzen (2010, p. 143ff.)

Fishbein and Ajzen (2010) suggest that descriptive and injunctive norms can coexist and can be either congruent with each other or contradictory.

3.2.2.2.3.2 Application to the Research

The measurement of perceived norms sought to identify relevant salient referents by means of a literature review as well as the inclusion of appropriate elicitation questions in the pilot study (see section 3.3.4.1) and then to ascertain the respondents' assessment of these referents in terms of SMP.

Table 23 – Research Operationalisation – Perceived Social Norms

RAA Variable	Perceived Norms		
RAA Definition	*Norms are defined as perceived social pressure to perform (or not to perform) a particular behaviour (Fishbein & Ajzen, 2010, p. 130)*		
Type of Norm	**Injunctive Norm (N_I)** $N_I \propto \sum n_i m_i$		**Descriptive Norm (N_D)** $N_D \propto \sum n_d$
Measurement Model	**Normative belief about referent I (n_i)**	**Motivation to comply with referent I (m_i)**	**Normative belief about referent D (n_d)**
Instrument	**Behaviour-specific Evaluation by salient referents** *Please indicate whether you believe that the following persons would approve or disapprove that you invest in stocks and/or mutual funds.* *Strongly approve – strongly disapprove*	**Motivation to comply** Please indicate also to what degree you value their opinion in this specific matter. *Highly value – Do not value*	**Behaviour-specific Evaluation by salient referents** *Indicate to what extent you believe that the following persons invest themselves in stock and/or mutual funds.* *Definitely Yes - Definitely No*
Scale	**Bi-Polar 5-point + N/A option**	**Unipolar 4-point**	**Bi-Polar 5-point + N/A option**
Identification of Salient Referents	**Identification based on Financial Literacy literature review as well as inclusion of elicitation question in pilot study.**		

Source: Own adaptation based on Fishbein and Ajzen (2010, Chapter 4)

The research operationalisation is summarised in Table 23 and includes an assessment of both injunctive and descriptive norms with regard to SMP (which is proxied by “invest in stocks and/or mutual funds”). For both types of norms, reference is made to individual salient referents. This contrasts with the simplified approach taken by Akhtar and Das (2019) that queries PSN primarily with instruments referring to “those who have important influence over me” or “persons whose opinion I value”, not differentiating between distinct salient referents or between the evaluation of opinion and the motivation to comply. Although several studies (Budd, North, & Spencer, 1984; Montano, Thompson, Taylor, & Mahloch, 1997; Sayeed, Fishbein, Hornik, Cappella, & Ahern, 2005) related to health care, drug abuse, and seat-belt usage find that weighing the normative belief with the motivation to comply makes only a small or no contribution to the prediction of injunctive norms, for the reported research, motivation to comply was measured and utilised in the determination of injunctive norms relevant to SMP. This decision was made with the consideration that measuring the motivation to comply is expected to add an additional layer confirming the salience of the identified referents. The measurement of normative beliefs (both injunctive and descriptive norms) is based on a five-

point bipolar scale, while motivation to comply (injunctive norm only) is based on a four-point unipolar scale. For all questions, a "not applicable" alternative was provided as not all referents would be applicable to all respondents. The results of the elicitation pilot study are summarised in section 3.3.4.2.1, and the detailed instrument items for the measurement of PSN are included in Appendix C.

A comprehensive measure of PSN can be obtained by including items representing both injunctive and descriptive norms (Fishbein & Ajzen, 2010). Consequently, a composite measure comprehensively combining the elements outlined above was computed as follows:

Table 24 – Measurement Approach – PSN

Category	First-Level Measure	Second-Level Measure
Injunctive norm	Composite injunctive norm score ("SCO_InjunctiveNorm_Sum"): Sum of injunctive norms (as per Equation 1) across all salient referents	Composite perceived norm score ("SCO_PerceivedNorm_Sum"): Sum of all first-level measures
Descriptive norm	Composite descriptive norm score ("SCO_InjunctiveNorm_Sum"): Sum of descriptive norms (as per Equation 2) across all salient referents	

3.2.2.2.4 Attitude

3.2.2.2.4.1 Implications of the Theoretical Framework

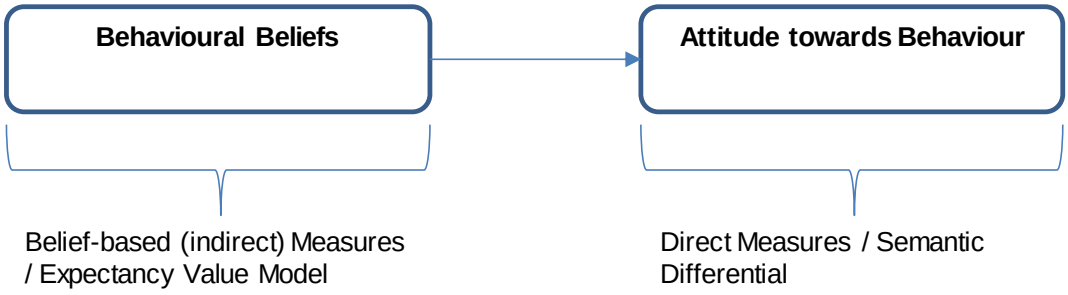
Humans react to their environment in an evaluative fashion, meaning that they covertly or overtly judge whether objects or subjects are favourable or unfavourable, good or bad (Albarracín, Zanna, Johnson, & Kumkale, 2005). Eagly and Chaiken (1993; cited in Albarracín et al., 2005) provide the following definition: "attitude is a psychological tendency that is expressed by evaluating a particular entity with some degree of favour or disfavour". Similarly, Fishbein and Ajzen (2010, p. 76) define attitude as a latent disposition or tendency to respond to a psychological object with some degree of favourableness or unfavourableness. The attitude object can be any discriminable aspect of an individual's world, including a behaviour. First, attitudes are evaluative in nature, ascribing to individuals a position on a unitary evaluative dimension with respect to an object, a dimension that ranges from negative to positive through a neutral point. There is widespread consensus among contemporary theorists and investigators engaged in basic research on attitudes that an attitude's essential characteristic is its bipolar evaluative dimension (Ajzen & Fishbein, 2005; Eagly & Chaiken, 2005; Krosnick, Judd, & Wittenbrink, 2005). People form attitudes on the basis of their cognitive, affective, and behavioural responses to an entity (Eagly & Chaiken, 1993; cited in

Albarracín et al., 2005). Nevertheless, while attitudes can both be inferred from and have an influence on beliefs, affect, and overt behaviour, the term attitudes is defined as evaluative tendencies (Albarracín et al., 2005), assuming that evaluative responses of various kinds can be used to infer attitudes (Fishbein & Ajzen, 2010, p. 76).

The objective of attitude measurement is to obtain a score that represents a respondent's position along a bipolar evaluative dimension with respect to the attitude object (Fishbein & Ajzen, 2010, p. 79). However, manifestations of an attitude, as assessed by any measurement procedure, are not the same as the attitude itself: measurement permits one to assign values to individuals in a theoretically meaningful manner such that differences in those values are thought to reflect differences in the underlying construct that is being measured (Krosnick et al., 2005). The origins of attitude measurement via direct self-reports lie in the work of Osgood, Suci, and Tannenbaum (1957), who develop the semantic differential method, the equal-appearing intervals method of Thurstone (1928), and Likert's method of summated ratings (Likert, 1932). Fishbein and Ajzen (2010, p. 96) find that the semantic differential as well as the Thurstone and Likert scaling methods result in reliable and valid attitude scores.

In the context of attitude measurement within the RAA, the following two separate elements have to be distinguished: within RAA, attitudes towards behaviour follow directly from beliefs about the attitude object as people form beliefs about an (attitude) object by associating the object with various characteristics, qualities, and attributes (Fishbein & Ajzen, 2010). Consequently, this differentiation gives rise to two separate measurement approaches, as exhibited in Table 25 and outlined in the subsequent sections.

Table 25 – Direct and Indirect Measures of Attitudes within the RAA Framework



Source: Own illustration based on Fishbein and Ajzen (2010)

A popular and comparatively simple method for attitude measurement is the semantic differential (Fishbein & Ajzen, 2010; Osgood et al., 1957). Applying this method in the context of measuring attitudes requires asking respondents to rate an attitude object on a set (frequently seven places) of bipolar evaluative adjective scales (e.g. *good–bad, harmful–*

beneficial, or pleasant–unpleasant), with responses usually scored from -3 on the negative side of the scale to +3 on the positive side (Fishbein & Ajzen, 2010, p. 79). Consequently, Fishbein and Ajzen (2010, p. 80) posit that the sum or mean across all the scales represents a measure of the person's attitude towards the attitude object. According to Fishbein and Ajzen (2010, p. 81), the semantic differential is the method by which attitudes towards behaviour are typically measured in the context of the RAA.

A different approach to attitude measurement was originally developed by Thurstone (1928), who posits that opinions or beliefs about an object can be viewed as verbal expressions of the attitude towards the object (Fishbein & Ajzen, 2010, p. 85). Consequently, this method seeks to measure a person's opinions or beliefs (frequently in terms of agreement or disagreement) regarding different opinion statements. The underlying attitude is then inferred from these beliefs to the extent that two criteria are met: firstly, the criterion of irrelevance requires that the response must reflect an evaluation of the attitude object under consideration and must not be a function of other factors; secondly, the evaluative implication of agreement has to be unambiguous (criterion of ambiguity) (Fishbein & Ajzen, 2010; Thurstone, 1928). For measurement purposes, a Likert scale (Likert, 1932) is applied ranging from strongly agree to strongly disagree on a five- or seven-point scale. Responses are scored from 1 to 5 or 7, respectively. Strong agreement with favourable items and strong disagreement with unfavourable items are scored the highest. In research, Cronbach's alpha coefficient is used as a measure of the degree to which the items on a Likert scale are internally consistent (Fishbein & Ajzen, 2010, p. 88; see section 3.3.6 for the reliability assessment). A further issue arises concerning whether the opinion statements should include a "Do not want to answer" (i.e. NO response) option. Based on a review of relevant research, Krosnick et al. (2005) find that "NO responses" often result not from a genuine lack of attitudes but rather from ambivalence, question ambiguity, satisficing, intimidation, and self-protection. Consequently, they posit that there is something meaningful to be learned from pressing participants to report their opinions but that NO response options discourage people from doing so. As a result, the data quality does not improve when such options are explicitly included in questions (Krosnick et al., 2005).

Fishbein and Ajzen (2010, p. 92) point out that opinion items are utilised based on the assumption that they provide information about the beliefs, feelings, and intentions that people hold with respect to the attitude object. However, scale inclusion requires the items to be valid indicators of the underlying attitude because the items correlate highly with the evaluative score. Consequently, responses to these items can be used as an indicator of the underlying attitude; however, Fishbein and Ajzen (2010, p. 92) argue that it would be a mistake to take

these responses to provide information about the causal determinants of the underlying attitude.

To address this issue, the expectancy–value model of attitude (Fishbein, 1963) was developed to understand the way in which beliefs causally influence attitudes. Based on the expectancy–value model, Fishbein and Ajzen (2010, p. 97) posit that people are assumed to have pre-existing evaluations of the attributes that become linked to an object in the process of belief formation. Depending on the strength of the belief, the attribute evaluations become associated with the attitude object and, in a process of summation, produce the overall attitude towards the object. This model is shown symbolically in Equation 3, where A stands for attitude towards an object, b_i is the strength of the belief that the object has attribute i, and e_i is the evaluation of attribute i.

Equation 3 – Expectancy–Value Model of Attitude

$$A \propto \sum b_i \, e_i$$

Source: Fishbein and Ajzen (2010, p. 97)

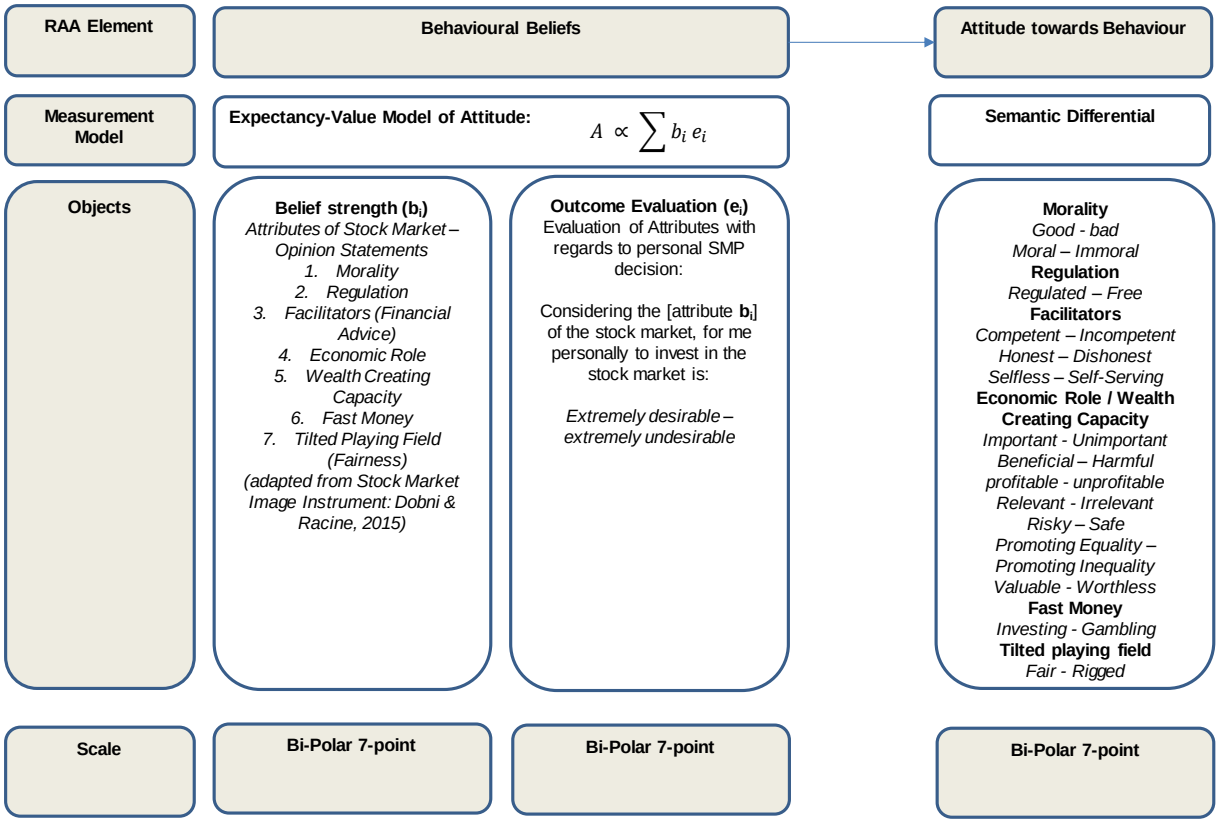
It can be seen that the evaluation of each attribute contributes to the attitude in direct proportion to the person's subjective probability that the object possesses the attribute in question (that is, the definition of belief according to Fishbein & Ajzen, 1975). Consequently, according to the model, people come to hold favourable attitudes towards objects that they associate with positively valued attributes and unfavourable attitudes towards objects that they associate with negatively valued attributes (Fishbein & Ajzen, 2010, p. 97). A person's attitude towards an object is, at any given moment, primarily determined by no more than five to nine readily accessible beliefs about the object (Fishbein & Ajzen, 2010, p. 99).

Several meta-analyses (Albarracin, Johnson, Fishbein, & Muellerleile, 2001; Armitage & Conner, 2001) provide correlational evidence in support of the expectancy–value model, reporting mean correlations ranging from 0.53 to 0.56 between the expectancy–value index of beliefs and a direct attitude measure (see section 4.1.3 for the analysis in the context of this research study).

3.2.2.2.4.2 Application to the Research

The purpose was to analyse the attitude towards the stock market as well as actual stock market participation.

Table 26 – Research Operationalisation – Attitude towards the Stock Market and SMP



Source: Own adaptation based on Fishbein and Ajzen (2010, Chapter 3) and Dobni and Racine (2015)

The research operationalisation is summarised in Table 26 and includes a belief-based (indirect) measure of attitude applying the EVM (see Equation 3 – Expectancy–Value Model of Attitude). The objects (A) are the stock market itself and SMP. For the purpose of attribute definition, an instrument measuring the stock market image developed by Dobni and Racine (2015) is utilised. To determine the images of the stock market, Dobni and Racine (2015) utilise exploratory factor analysis to reduce 40 stock market image statements to the following factors shown in Table 27:

Table 27 – Stock Market Image Factors

Factor	Description	Instruments	Cronbach's Alpha
Morality	The extent to which the stock market is perceived to be unethical, corrupt, and gambling-like	8 opinion statements	0.851
Facilitators/ regulators	The perceived competency, effectiveness, and trustworthiness of stock market facilitators (e.g. investment advisory services) and regulators	8 opinion statements	0.876
Economic bellwether	The extent to which the stock market is perceived to contribute to and foreshadow economic growth or malaise	4 opinion statements	0.790
Wealth-creating capacity	The extent to which the stock market is viewed as a dependable and lucrative vehicle for lay investors to build financial assets	5 opinion statements	0.806
Fast money	The extent to which the stock market is viewed as a venue for making quick gains	3 opinion statements	0.557
Tilted playing field	The extent to which the stock market is perceived to favour large, sophisticated investors at the expense of lay investors	3 opinion statements	0.568

Source: Adapted from Dobni and Racine (2015)

In their study, Dobni and Racine (2015) perform a multi-method procedure to elicit the key stock market images, as outlined in Table 27. Therefore, these stock market images were utilised as salient belief attributes associated with the stock market for the purpose of measuring belief strength in the EVM context. Consequently, the opinion statements formulated by Dobni and Racine (2015) were utilised for measurement purposes with a bipolar seven-point "agree–disagree" Likert scale. Subsequently, to measure outcome evaluation, the respondents were asked whether – when considering the stock market attributes – this would make SMP personally more or less desirable for them. To that end, the outcome evaluation questions were scored on a bipolar seven-point "desirable–undesirable" scale.

For the direct attitude measure, a set of semantic differential questions was utilised. The relevant evaluative semantic pairs were derived indirectly from analysing Dobni and Racine's (2015) study for adjectives and salient items related to the stock market images. The measurement was based on a bipolar seven-point scale with the midpoint indicating a neutral position towards the evaluative pair. The detailed items for attitude measurement are included in Appendix C.

A comprehensive measure of FA can be obtained by including items representing both indirectly (behavioural beliefs) and directly (attitude towards behaviour) measured items

(Fishbein & Ajzen, 2010). Consequently, a composite measure combining the elements outlined above can be computed as follows:

Table 28 – Measurement Approach – Financial Attitude

Category	First-Level Measure	Second-Level Measure
Indirect measurement (behavioural beliefs, expectancy–value model)	Composite indirect attitude score ("SCO_Attitude_Indirect_Sum"): Sum of the expectancy–value model scores (as per Equation 3) across all attitude dimensions Max. range of outcome values: -63 to +63	Composite attitude score ("SCO_Attitude_Sum"): Sum of all first-level measures Max. range of outcome values: -84 to + 84
Direct measurement (attitude towards behaviour, semantic differentials)	Composite direct attitude score ("SCO_Attitude_Direct_Sum"): Sum of the semantic differential scores for all attitude dimensions Max. range of outcome values: -21 to + 21	

3.2.2.3 Outcome Variable

3.2.2.3.1 Implications of the Theoretical Framework

According to Fishbein and Ajzen (2010, p. 39), behavioural intentions are indications of a person's readiness to perform a specific behaviour: the essential underlying dimension characterising the intention is a person's own (i.e. subjective) estimate of the likelihood and, respectively, perceived probability of performing a certain behaviour. Consequently, *intention* is defined within the RAA framework as the *subjective probability of performing a behaviour* (Fishbein & Ajzen, 2010, p. 39 et seqq.). Behavioural intentions are the most important immediate antecedent of actual behaviour (Fishbein & Ajzen, 2010, p. 39; see Table 13). A concept related to behavioural intentions (items such as "I intend to …" and "I plan to …" are most frequently employed) is behavioural expectation or self-predictions utilising items such as "I expect to …" and "I will …". Although an initial meta-analysis by Sheppard et al. (1988) indicates that behavioural expectations are superior to behavioural intentions in terms of predicting behaviour, more recent meta-analyses (Armitage & Conner, 2001; Sheeran & Orbell, 1998) fail to provide support for behavioural expectation measures. In the RAA framework, intention is thought to incorporate such concepts as behavioural expectation, willingness, and trying by referring to the readiness to engage in a specific behaviour (Fishbein & Ajzen, 2010, p. 43).

The central objective of the RAA is to understand why people do or do not perform a specific behaviour. A dichotomous behavioural measure (e.g., in the research context at hand, to participate in the stock market or not to participate in the stock market) is most suitable for these investigations (Fishbein & Ajzen, 2010, p. 43): for the purpose of predicting a dichotomous behaviour choice, the measure of intention also needs to correspond to the dichotomous character. Consequently, the measure of intention could be to ask respondents whether they intend or do not intend to perform a certain behaviour. The sensitivity of the measure can be increased by obtaining a self-assessment of how strongly they intend or do not intend to perform the behaviour (Fishbein & Ajzen, 2010), utilising scales such as *agree–disagree, true–false, probable–improbable, or likely–unlikely.* To improve reliability, Fishbein and Ajzen (2010, p. 44) recommend using two or more intention items appearing at different points in the questionnaire.

The most important requirement for predictive validity is that the measure of intention is compatible ("principle of compatibility", Fishbein & Ajzen, 1975) with the behavioural criterion in terms of its generality or specificity (Fishbein & Ajzen, 2010, p. 44). According to the principle of compatibility, an intention is compatible with a behaviour if – based on the desired level of generality – the measure of intention involves the same action target, context, and time

elements as the measure of behaviour (Fishbein & Ajzen, 2010, p. 44). According to Fishbein and Ajzen (2010, p. 31), a high level of generality means that the action is not defined narrowly (e.g. buying a certain stock) but rather as a category of behaviours (e.g. buying and holding stock), leaving the target and context elements unspecified. Fishbein and Ajzen (2010, p. 48) posit that – to the extent that intention and behaviour comply with the principle of compatibility – intentions can be utilised to predict behaviour and in fact account for an appreciable proportion of variance in actual behaviour. A wide range of meta-analyses (see section 3.2.1.2 for details) substantiate the predictive validity of behavioural intentions.

3.2.2.3.2 Application to the Research

The overall purpose of this research was to assess undergraduate students' BI to participate in the stock market (SMP). The measure of intention requires compatibility with the underlying behaviour at an appropriate level of generality considering the elements action, target, context, and time. Due to the cross-sectional nature of the research as well as the general situation of the study subjects,[10] assessment of the actual behaviour was deemed not to be feasible. Nevertheless, the intention measure still requires compatibility with the actual behaviour even if the measurement (either by self-report or direct observation) of the behaviour is beyond the scope of the study.

In this context, "participate in the stock market" constituted the behavioural action element and was further operationalised as "invest in stocks and/or equity mutual funds". Consistent with a high level of generality (see Fishbein & Ajzen, 2010, Table 2.2), the context and target elements were left unspecified. Including a context element of "for the purpose of saving and wealth building" was considered; however, as the underlying research interest was determining SMP intention, the context of investing in the stock market – be it for speculation or long-term wealth-building purposes – was not strictly relevant. Nevertheless, an additional question based on Dobni and Racine (2016) considering the objectives for investing in the stock market was included subsequent to the third intention measure (see Table 29).

Due to the study subjects being undergraduate students who have yet to enter professional life, it can be assumed that, in terms of the "time" element, an absolute measure (e.g. "in the next 12 months") might not be meaningful as the potential to invest in the stock market is expected to be limited by personal financial circumstances. Consequently, the time element

[10] The study subjects are undergraduate students prior to their entry into professional life. Consequently, the assessment of actual behaviour was deemed not to be meaningful as refraining from SMP might simply be due to inadequate recurring income for saving purposes.

was defined in relative and highly general terms as “as soon as personal financial circumstances allow it” (i.e. after graduating and finding professional employment with recurring income). As the underlying behaviour (to participate or not to participate in the stock market) is dichotomous, the measure of intention was based on a dichotomous scale. As recommended by Fishbein and Ajzen (2010, p. 44), several intention measures were included, placed at different points in the questionnaire. A composite behavioural intention score representing the mean of the individually placed items was calculated. The measures are summarised in Table 29 and included in Appendix C.

Table 29 – Measurement – Behavioural Intention

No.	Measure	Scale	Placement in Questionnaire
1	I *expect* to invest in stocks and/or equity mutual funds as soon as my personal financial circumstances allow it.	7-point “definitely do/definitely do not”	Subsequent to socio-demographic background questions; see Appendix C (Q.4.1–Q.4.3)
2	I want to invest in stocks and/or equity mutual funds as soon as my personal financial circumstances allow it.	7-point “extremely likely/extremely unlikely”	Subsequent to perceived behavioural control questions; see Appendix C (Q.8.1–Q.8.2)
3	I intend to invest in stocks and/or equity mutual funds as soon as my personal financial circumstances allow it.	7-point “strongly agree/strongly disagree”	Final element; see Appendix C (Q.14.1–Q.14.2)

Source: Own illustration

3.2.2.4 Background Variables

3.2.2.4.1 Implications of the Theoretical Framework

The RAA (Fishbein & Ajzen, 2010, p. 221) posits that the psychological foundation for human action can be found in behavioural (see section 3.2.2.2.4), normative (see section 3.2.2.2.3), and control beliefs (see section 3.2.2.2.1). These beliefs are not inborn but acquired in daily encounters with the real world as people’s experience is likely to vary as a function of their personal characteristics and socio-demographic factors (Fishbein & Ajzen, 2010, p. 224). The RAA does not specifically prescribe which background factors should be included but suggests that a background factor should only be considered if there is reason to believe that people who vary in terms of that factor may have been exposed to different experiences and consequently formed different behaviour-relevant beliefs (Fishbein & Ajzen, 2010, p. 224).

3.2.2.5 Socio-demographic Variables

Irrespective of the researched behaviour, most research studies collect information about demographic characteristics with the idea that segmenting the population along these dimensions might allow them to determine whether significant differences exist between

various sub-groups (Fishbein & Ajzen, 2010, p. 224). The prior literature identifies a number of predominantly socio-demographic variables that are expected to be associated with a higher level of FL (see section 2.5.3) and a higher rate of SMP (see section 2.4.4.2). Consequently, these factors will be utilised as socio-demographic background factors and are summarised in Table 30.

Table 30 – Socio-demographic Background Factors

Background Factor	Measurement Item	Scale
Age	Year of birth	Ordinal
Nationality	Principle nationality	Nominal
Gender	Male or female	Nominal
Study subject	Study programme (bachelor's degree programme) currently enrolled in	Nominal
Class rank (study year)	- Semester of study according to the study programme syllabus	Ordinal
Personal finance education	- Prior to university studies - During university studies	Dichotomous (yes/no)
Education level of parents	Highest level of formal education that either parent (or legal guardian) obtained	Ordinal
General experience	- Living arrangements - Source of financial support	Nominal
Stock market experience	Measures whether a respondent has actual stock market participation experience	Dichotomous (yes/no)

Source: Own illustration based on consideration of the literature review results outlined in Chapter 2.

The detailed socio-demographic background factor questions are included in Appendix C.

3.2.2.5.1 Character-Based Variables

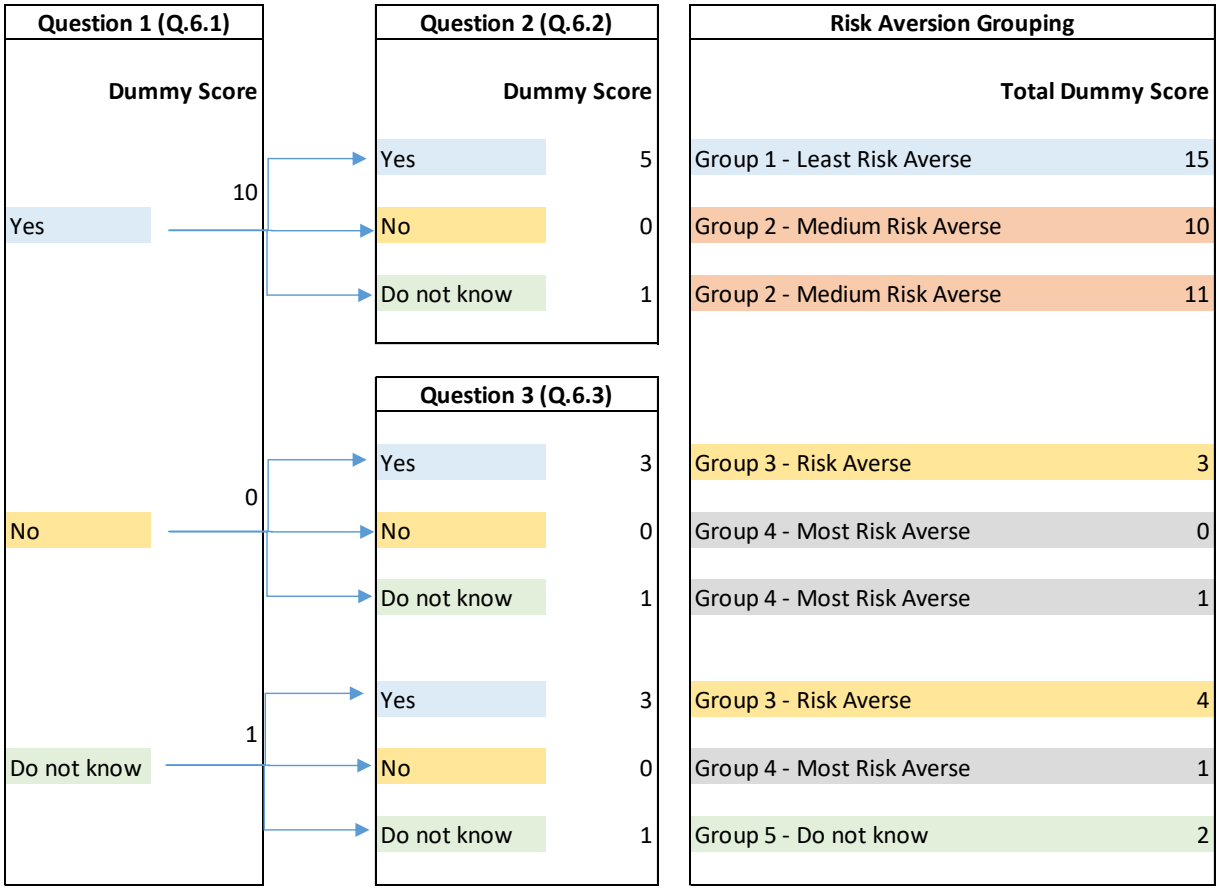
Fishbein and Ajzen (2010, p. 237) state that personal dispositions are of interest to the extent that they correlate significantly with the behaviour under investigation (see also section 2.4.4.4 for character-based variables found in prior research to correlate with SMP). The first character-based variable included as a background factor is the *disposition to trust*, which is defined as "the subjective probability individuals attribute to the possibility of being cheated" (Dobni & Racine, 2016; Guiso et al., 2008). Trust is expected to be relevant in the stock market context as the investing process is considered to be complex and indeterminate (Dobni & Racine, 2016) and the decision to participate in stock market stocks requires not only an assessment of the risk–return trade-off but also an act of faith (trust) that the data on which a stock purchase decision is based are reliable and that the overall system is fair (Guiso et al., 2008). Guiso et al. (2008) analyse the correlation between trust and SMP for a sample of Dutch people and find that less trusting individuals are less likely to buy stock and, conditional on buying stock, they will buy less. They conclude that trust is an important factor in explaining

the SMPP. Consequently, disposition to trust is deemed to be of interest in the context of the proposed research and is measured by a three-opinion statement instrument developed by Naef and Schupp (2009) and previously utilised in the stock market context by Dobni and Racine (2016).

Dobni and Racine (2016) posit that an individual's *sociability* might affect his or her perceptions of the stock market based on the finding by Hong et al. (2004) that social American households – those that interact with their neighbours or attend church – are substantially more likely to invest in the market than non-social households. Consequently, Dobni and Racine (2016) find that sociability is significantly correlated with the stock market image factors "facilitators and regulators" as well as "wealth creation" and "fast money" (see section 3.2.2.2.4.2 on p. 81 as well as Table 27 for an explanation of stock market image factors). For the research at hand, *sociability* was included as a background factor and measured by the six-item scale developed by Hong et al. (2004) and utilised by Dobni and Racine (2016) in which respondents report the frequency of their interactions with others in six specific contexts. Additionally, Dobni and Racine (2015, 2016) include the *level of optimism* as a control variable and utilise it as a distinguishing factor for clustering investor types. Nofsinger (2005) posits that a general optimistic/pessimistic mood of society is transmitted through social interaction and in turn influences all types of decisions, including financial ones. Consequently, including the level of optimism as a background factor appeared to be warranted as different levels of SMP might also be explained by individuals' different levels of proneness to optimism or pessimism. The measurement was based on the six-item instrument developed by Scheier, Bridges, and Carver (1994) and previously utilised by Dobni and Racine (2015, 2016).

Risk aversion (see also section 2.4.4.4) was included as a background factor: preferences for risk are deemed to be important determinants of SMP (van Rooij et al., 2011b), although they are not sufficient to explain the SMPP in isolation (Haliassos & Bertaut, 1995). Nevertheless, research indicates that individuals who are less willing to take risks are less likely to participate in the stock market (van Rooij et al., 2011b) and might have a more negative image of the stock market (Dobni & Racine, 2015). The measurement was based on a three-question instrument developed by van Rooij et al. (2011b) of which the respondent answered two questions based on his or her response to the first question. Risk aversion was evaluated based on a dummy variable categorising the respondents into five categories, as outlined in Table 31.

Table 31 – Risk Aversion Grouping Dummy Variable



Source: Own depiction based on van Rooij et al. (2011b)

SMP is based on the premise that an individual has a certain amount of savings at his or her disposal and is willing to forego immediate consumption by investing in the expectation of a higher future reward. Consequently, an additional fundamental precondition for SMP might be the willingness to save. An OECD questionnaire previously utilised in a large-scale FL study in 14 countries (Atkinson & Messy, 2012) contains three scaled opinion statements concerning preferences towards saving for future versus immediate consumption: “I find it more satisfying to spend money than to save it for the long term”, “I tend to live for today and let tomorrow take care of itself”, and “Money is there to be spent”. To gauge respondents’ fundamental *money preferences* and to benchmark to the large population included in the OECD study, this instrument was also included as a background factor. The detailed character-based background factor questions are summarised in Table 32 and included in Appendix C.

Table 32 – Character-Based Background Factors

Background Factor	Measurement Item	Measurement Scale	Scoring Procedure	Adapted from
Disposition to trust	Measures an individual's generalised trust by averaging the degree of agreement with 3 statements related to trust in other people and strangers. A higher score indicates a higher level of mistrust (a lower level of trust)	- Unipolar 7-point - Strongly agree–strongly disagree	Simple unweighted average of component scores	Dobni and Racine (2016); Naef and Schupp (2009)
Sociability	Measures an individual's sociability by assessing the frequency of participation in 6 distinct social activities	- Categorical - 7 frequency measures from "never" to "almost daily"	Simple unweighted average of component scores	Dobni and Racine (2016); Hong et al. (2004)
Level of optimism	Measures an individual's general level of optimism by averaging the degree of agreement with 6 statements related to expectations for the best and optimism about the future. A higher score indicates a higher level of optimism	- Unipolar 7-point - Strongly agree–strongly disagree	Simple unweighted average of component scores	Dobni and Racine (2016); Scheier et al. (1994)
Risk aversion	Measures an individual's level of risk aversion/risk proneness by means of 3 hypothetical scenarios: as a sole income earner taking a new job with a 50% chance of doubling the income and a 50% chance of cutting it by 33%/50%/20%	- Categorical - Yes/no	Grouping into 5 categories	Van Rooij et al. (2011b)
Money preferences	Measures an individual's money preferences by means of 3 opinion statements about whether there is a greater inclination towards spending money in the short term than saving money for the long term	- Unipolar 7-point - Strongly agree–strongly disagree	Simple unweighted average of component scores	Atkinson and Messy (2012)

Source: Own illustration based on the referenced studies

3.2.3 Hypothesis Formulation

Based on the RAA theoretical framework (section 3.2.1) and the definition of the variables and underlying constructs to be measured (section 3.3) in the research at hand, the following hypotheses can be proposed for subsequent testing. The structure of the hypothesis formulation follows the RAA framework (see Table 14) to the extent that background factors are expected to influence the predictor variables (FA, PBC, and PSN), which in turn influence the outcome variable (BI). Hypotheses will be posited as directional alternative hypotheses (Creswell, 2014a).

3.2.3.1 Primary Hypotheses

The RAA framework posits that attitudinal, normative, and control considerations determine a person's intention, although it is conceivable that one or even two of the three basic determinants may not carry a significant weight in the prediction of intention (Fishbein & Ajzen, 2010, p. 179 et seq.). The primary hypotheses of the research at hand are therefore related to the prediction of the outcome variable BI and are summarised in Table 33 with the hypothesis rationale explained briefly thereafter.

Table 33 – Hypotheses for the Dependent Variable: Behavioural Intention

No.	Predictor	Alternative Hypothesis	Null Hypothesis	References
H.1-1	FA	Stock market attitudes (FA) positively influence the intention to participate in the stock market (BI).	Stock market attitudes (FA) do not influence the intention to participate in the stock market (BI).	See section 2.4.5 on "Beliefs"; Dobni and Racine (2015, 2016)
H.1-2	PSN	PSNs positively influence the intention to participate in the stock market (BI).	PSNs do not influence the intention to participate in the stock market (BI).	See section 2.4.4.5
H.1-3	PBC	PBC (SK) positively influences the intention to participate in the stock market (BI).	PBC (SK) does not influence the intention to participate in the stock market (BI).	See section 2.4.4.3
H.1-4	FA, PSN, PBC	The predictor variables (FA, PSN, and PBC) will significantly explain the variance in the outcome variable intention to participate in the stock market (BI).	The predictor variables (FA, PSN, and PBC) will not explain the variance in the outcome variable intention to participate in the stock market (BI).	See section 3.2.1

In general terms, it is reasonable to posit (Fishbein & Ajzen, 2010, p. 181) that behavioural intention will strengthen to the extent that people hold a favourable attitude towards the behaviour. Dobni and Racine (2016) find that stock market images are a strong predictor of investor consequences, in particular a positive view of the wealth-creating capacity correlated with the investor motive of pursuing wealth creation. Consequently, it is reasonable to expect

that attitude will be an equally strong predictor of behavioural intention and that a positive image of the stock market (attitude) will lead to a stronger intention to participate in the stock market. This consideration leads to Hypothesis **H.1-1**.

Furthermore, the RAA (Fishbein & Ajzen, 2010, p. 181) suggests that, to the extent people feel social pressure to perform a behaviour, the intention to perform the behaviour should be strengthened. A number of FL studies (Akben-Selcuk & Altiok-Yilmaz, 2014; Altintas, 2011; Gerrans & Heaney, 2019; Huzdik et al., 2014; Luksander et al., 2014; Sabri et al., 2010) find that socialisation by parents has a positive influence on FL. Several other studies show that peer pressure can be a strong determinant of portfolio choice (Brown et al., 2008; Hong et al., 2004) and matters for stock ownership (van Rooij et al., 2011b). As outlined in section 2.4.4.5, higher SMP rates are positively associated with perceived social norms, such as media consumption, family context, social interactions, and financial advice. Based on these findings, it is reasonable to expect that a positive PSN to participate in the stock market by salient referents will lead to a stronger intention to participate in the stock market, thus leading to Hypothesis **H.1-2**.

The RAA does not generally expect a strong direct correlation between PBC and BI (Fishbein & Ajzen, 2010, p. 181). However, Van Rooij et al. (2011b) find that there is a strong correlation between objective literacy (which in the RAA context is construed as actual control; see section 3.2.2.2.2) and subjective literacy (which is construed as perceived behavioural control; see 3.2.2.2.1) and subsequently identify inadequate FL as a significant deterrent to stock ownership. Consequently, this leads to Hypothesis **H.1-3** suggesting that higher perceived subjective FL will lead to a stronger intention to participate in the stock market.

Furthermore, hypothesis **H.1-4** suggests that all three predictor variables of the RAA framework significantly explain the variance in behavioural intention. The acceptance of this hypothesis would provide further evidence (see section 3.2.1.3) that the RAA framework is suitable for analysing and predicting financial behaviours such as SMP.

3.2.3.2 Secondary Hypotheses

Besides the primary objective of the RAA framework of predicting BI from the three major determinants, it was possible to define a number of secondary hypotheses that primarily establish the expected relationships between the background factors and the three major determinants of BI: FA (section 3.2.2.2.4), PBC (section 3.2.3.2.2), and PSN (section 3.2.3.2.3). Based on the prior findings in the literature (see section 2.4.4.3), the associations between AC (OK) and character-based and socio-demographic background factors were also tested. The stipulated secondary hypotheses suggest that factors previously identified to be associated with higher SMP rates and higher OK levels might predict variances in the higher order RAA predictor variables as well as AC.

3.2.3.2.1 Prediction of Attitude

Table 34 – Hypotheses for the Prediction of Attitude

No.	Predictor Variables	Alternative Hypothesis	Null Hypothesis	Reference
H.2-1	Character-based variables	Character-based variables will significantly predict the variance in attitude towards the stock market.	Character-based variables will **not** significantly predict the variance in attitude towards the stock market.	See section 2.4.4.4
H.2-2	Socio-demo-graphic variables	Socio-demographic variables will significantly predict the variance in attitude towards the stock market.	Socio-demographic variables will **not** significantly predict the variance in attitude towards the stock market.	See section 2.4.4.2
H.2-3	Actual control (OK)	Actual control (OK) will significantly predict the variance in attitude towards the stock market.	Actual control (OK) will **not** significantly predict the variance in attitude towards the stock market.	See section 2.4.4.3

3.2.3.2.2 Prediction of Perceived Behavioural Control

Table 35 – Hypotheses for the Prediction of Perceived Behavioural Control

No.	Predictor Variables	Alternative Hypothesis	Null Hypothesis	References
H.2-4	Character-based variables	Character-based variables will significantly predict the variance in PBC.	Character-based variables will **not** significantly predict the variance in PBC.	See section 2.4.4.4
H.2-5	Socio-demo-graphic variables	Socio-demographic variables will significantly predict the variance in PBC.	Socio-demographic variables will **not** significantly predict the variance in PBC.	See section 2.4.4.2
H.2-6	Actual control (OK)	Actual control (OK) will significantly predict the variance in PBC.	Actual control (OK) will **not** significantly predict the variance in PBC.	See section 2.4.4.3

3.2.3.2.3 Prediction of Perceived Social Norms

Table 36 – Hypotheses for the Prediction of Perceived Social Norms

No.	Predictor Variables	Alternative Hypothesis	Null Hypothesis	References
H.2-7	Character-based variables	Character-based variables will significantly predict the variance in PSN.	Character-based variables will **not** significantly predict the variance in PSN.	See section 2.4.4.4
H.2-8	Socio-demo-graphic variables	Socio-demographic variables will significantly predict the variance in PSN.	Socio-demographic variables will **not** significantly predict the variance in PSN.	See section 2.4.4.2
H.2-9	Actual control (OK)	Actual control (OK) will significantly predict the variance in PSN.	Actual control (OK) will **not** significantly predict the variance in PSN.	See section 2.4.4.3

3.2.3.2.4 Prediction of Actual Control (OK)

Table 37 – Hypotheses for the Prediction of Actual Control (OK)

No.	Predictor Variables	Alternative Hypothesis	Null Hypothesis	References
H.2-10	Character-based variables	Character-based variables will significantly predict the variance in OK.	Character-based variables will **not** significantly predict the variance in OK.	See section 2.4.4.4 and section 2.5.3
H.2-11	Socio-demo-graphic variables	Socio-demographic variables will significantly predict the variance in OK.	Socio-demographic variables will **not** significantly predict the variance in OK.	See section 2.4.4.2 and section 2.5.3

3.2.4 Summary

Section 3.2 assessed the RAA as a suitable theoretical framework for this research study. The predictive value of the RAA (and its predecessor framework the TPB) is strongly supported by empirical evidence across a multitude of social behaviours and can be considered one of the most valid psychological models to study human behaviour (Pascual-Ezama et al., 2014). Thus, its application in this research study was deemed appropriate. Based on the RAA framework, the relevant predictor (FA, PBC, AC, and PSN), outcome (BI), and background variables were introduced (see Table 16) and discussed concerning the implications and operationalisation within the context of this research project. Based on the discussion of the relevant variables, primary and secondary testable hypotheses were established for subsequent testing, specifying the expected relationships between the variables.

3.3 Research Strategy

3.3.1 Introduction

The preceding section 3.1 outlined the theoretical framework applied, the relevant variables, and their research operationalisation and established a number of testable hypotheses. The purpose of this section is to set out the research methodology that was adopted to test these hypotheses. The appropriateness of the research methodology is important in particular to minimise the opportunities for the introduction of biases into the collection, the subsequent analysis of data, and the eventual formulation of conclusions. The following chapter is organised as follows.

Section 3.3.2 discusses the philosophical perspective of this research. Section 3.3.3 outlines the general research strategy deemed appropriate given the conclusions reached in section 3.3.2, while section 3.3.4 elaborates on data collection methods. Section 3.3.5 considers issues relating to sample selection with the objective of improving the generalisability of the research findings. Section 3.3.6 considers instrument reliability while Section 3.3.7 addresses issues associated with the validity of the research instrument, and section 3.3.8 considers the appropriate data analysis techniques. The section concludes with an appraisal of the specific ethical issues relevant to the research methodology applied in section 3.3.9.

3.3.2 Philosophical Perspective

3.3.2.1 Ontology

Ontology refers to assumptions about the nature of reality shaping the way in which the research subject is seen and studied (Saunders et al., 2016, p. 127). Consequently, ontological questions include (Saunders et al., 2016, p. 129):

- What is the nature of reality?
- What is the world like?

Social ontology questions whether social entities can or should be regarded as objective entities that have a reality external to social actors or whether they should be regarded as social constructions created from the perceptions and actions of social actors (Bryman & Bell, 2015, p. 32).

According to Bryman and Bell (2015), *objectivism* is an ontological position that asserts that social phenomena and their meanings have an existence that is independent of social actors. Consequently, it implies that social phenomena and the categories that we use in everyday life have an existence that is independent or separate from actors. The alternative ontological position is *constructionism*, which asserts that social phenomena and their meanings are

continually being accomplished by social actors (Bryman & Bell, 2015, p. 33). It implies that reality is constructed through social interaction in which social actors create partially shared meanings and realities (Saunders et al., 2016).

As with most phenomena, the constructs FL, FA, and BI could be considered from both ontological perspectives. The relevant question is whether objectivism or constructionism will provide a more useful framework in the specific circumstance. For the proposed study, the ontological position of objectivism was appropriate as the objective was to assess the relationships between the established variables of the RAA framework with specific application to the question of influencing the intention to participate in the stock market. These relationships can objectively be measured independently from their actors. Consequently, a constructionist framework asserting partially shared realities depending on the social actors would not be adequate.

3.3.2.2 Epistemology

Epistemology concerns the question of what is or should be regarded as acceptable knowledge in a discipline. A central issue in this context is the question of whether the social world can and should be studied according to the same principles, procedures, and ethos as the natural sciences (Bryman & Bell, 2015, p. 26).

Two main contrasting approaches are considered in the field of social sciences and business administration. *Positivism* advocates the application of the methods of the natural sciences to the study of social reality (Bryman & Bell, 2015) and consequently entails working with an observable social reality to produce law-like generalisations (Saunders et al., 2016). *Positivism* holds an underlying deterministic philosophy in which causes (probably) determine effects or outcomes. Thus, the problems reflect the need to identify and assess the causes that influence outcomes (Creswell, 2014, p. 7). For the proposed research, the epistemological stance of *positivism* appeared to be appropriate as the aim of the research was to analyse the variables that influence undergraduate students' BI regarding a specific behaviour (SMP). Consequently, the aim of the research was to predict relationships and suggest causal explanations, which conforms predominantly to scientific methods (RAA framework).

Interpretivism is an alternative to positivism and is based on the view that a strategy is required that respects the differences between people and objects of the natural sciences and therefore requires the social scientist to grasp the subjective meaning of social action (Bryman & Bell, 2015, p. 29). As the purpose of the study was to verify the existence of objective relationships between variables, an interpretivist approach focusing on subjective meaning was not deemed constructive.

3.3.2.3 Axiology

Axiology refers to the role of values and ethics within the research process, incorporating questions about how the researcher deals with his own values and those of the research participants (Saunders et al., 2016, p. 128). Heron (1996; quoted in Saunders et al., 2016) argues that researchers' values are the guiding reason for all human action. He further argues that researchers demonstrate axiological skill by being able to articulate their values as a basis for making judgements about what research they are conducting and how they set about accomplishing it.

Concurring with the statement put forward by Volpe, Chen, and Pavlicko (1996) that "the importance of personal investment decisions cannot be overemphasized because they have a direct impact on people's quality of life", it is the author's belief that SMP and a positive BI in this context are an important element of the long-term well-being and retirement preparation of young adults who are in their final formative educational stage prior to entering professional life. Nevertheless, since assessments of FL and SMPP – despite in-depth research with adults or students in English-speaking countries – are scarce in the German-speaking part of Europe (Aprea & Wuttke, 2016; Stolper & Walter, 2017), an objectivist and consequently detached and value-free approach to this research was warranted to establish an empirical foundation for the research's subject matter in the specific German undergraduate student context.

3.3.2.4 Research Paradigm

Based on the evaluation in the previous section, *positivism* was considered to be the most appropriate research paradigm for the research project. The following table outlines the typical characterisation of a positivist research philosophy as well as its implementation in the current research.

Table 38 – Evaluation of the Positivist Research Paradigm

	General Characterisation	Specific Application to proposed research
Ontology	- Real, external, independent - one true reality (universalism) - Granular - ordered	- Variables of attitudes, perceived social norms and perceived behavioural control deemed to be external from social actors
Epistomology	- Scientific method - observable and measurable facts - Law-like generalisations - Causal explanation and prediction as contribution	- Relationships between relevant variables can be empirically measured - Deductive approach based on RAA theoretical framework, hypotheses and causal expectations deduced from existing research
Axiology	- Value-free research - Researcher is detached, neutral and independent of what is researched - Researcher maintains objective stance	- Quantitative research approach based on value-free deductive formulation of hypotheses, predetermined and structured data collection techniques ensures objective stance to either prove or disprove hypotheses
Typical methods	Typially deductive, highly structured, large samples, measurement, typically quantitative method of analysis	- Quantitative method (Survey)

Source: Adapted from Saunders et al. (2016, p. 136)

Consequently, this research study was deductive in nature since a particular theoretical framework (RAA) facilitated the development of a number of testable hypotheses (section 3.2.3) in relation to an outcome variable, "behavioural intention to participate in the stock market". Empirical data were collected to enable conclusions to be reached. The acceptance or rejection of the hypotheses would enable the theories to be confirmed, revised, or rejected.

3.3.2.5 Approach to Theory Development

The term "theory" is most commonly understood as a way of explaining observed regularities (Bryman & Bell, 2015, p. 20). Edmondson and McManus (2007) suggest that theory falls along a continuum – from mature to nascent – based on the state of prior theory and research (see Table 39).

Table 39 – Archetypes of Methodological Fit in Field Research

Three Archetypes of Methodological Fit in Field Research

State of Prior Theory and Research	Nascent	Intermediate	Mature
Research questions	Open-ended inquiry about a phenomenon of interest	Proposed relationships between new and established constructs	Focused questions and/or hypotheses relating existing constructs
Type of data collected	Qualitative, initially open-ended data that need to be interpreted for meaning	Hybrid (both qualitative and quantitative)	Quantitative data; focused measures where extent or amount is meaningful
Illustrative methods for collecting data	Interviews; observations; obtaining documents or other material from field sites relevant to the phenomena of interest	Interviews; observations; surveys; obtaining material from field sites relevant to the phenomena of interest	Surveys; interviews or observations designed to be systematically coded and quantified; obtaining data from field sites that measure the extent or amount of salient constructs
Constructs and measures	Typically new constructs, few formal measures	Typically one or more new constructs and/or new measures	Typically relying heavily on existing constructs and measures
Goal of data analyses	Pattern identification	Preliminary or exploratory testing of new propositions and/or new constructs	Formal hypothesis testing
Data analysis methods	Thematic content analysis coding for evidence of constructs	Content analysis, exploratory statistics, and preliminary tests	Statistical inference, standard statistical analyses
Theoretical contribution	A suggestive theory, often an invitation for further work on the issue or set of issues opened up by the study	A provisional theory, often one that integrates previously separate bodies of work	A supported theory that may add specificity, new mechanisms, or new boundaries to existing theories

Source: Edmondson and McManus (2007)

A considerable amount of research exists concerning SMP (section 2.4) and FL (section 2.5) as well research applying the RAA framework (section 3.2.1). Consequently, based on the detailed assessment outlined in Table 40, the research field for this study can be deemed to be mature.

Table 40 – Assessment of Methodological Fit

State of prior Theory and Research	"Mature" archetype of methodological fit	Research Study	Section Reference
Research Questions	Focused questions and/or hypotheses relating existing constructs	Hypothesis testing of existing constructs outlined by the RAA framework: financial literacy (objective and subjective financial knowledge), attitudes and perceived social norms	Section 3.2
Type of data collected	Quantitative data; focused measures where extent or amount is meaningful	Survey design based on quantitative methods applying RAA framework	Section 3.3.4
Illustrative methods for collecting data	Surveys; interviews or observations designed to be systematically coded and quantified; obtaining data from field sites that measure the extent or amount of salient constructs	Survey design based on quantitative methods applying RAA framework	Section 3.3.4
Constructs and measures	Typically relying heavily on existing constructs and measures	Variables defined by RAA framework and applied to the behaviour "SMP"	Chapter 2 and Chapter 3 (Section 3.2)
Goal of data analysis	Formal hypothesis testing	Hypothesis testing of existing constructs outlined by the RAA framework: financial literacy (objective and subjective financial knowledge), attitudes and perceived social norms	Chapter 4 (Section 4.2)
Data analysis methods	Statistical inference, standard statistical analysis	Survey design based on quantitative methods applying RAA framework	Chapter 4
Theoretical contribution	A supported theory that may add specificity, new mechanisms, or new boundaries to existing theory	Expanding theory by applying the RAA framework to predict intention and behaviour to the SMP puzzle in a specific German university context.	Section 4.3 and Chapter 5

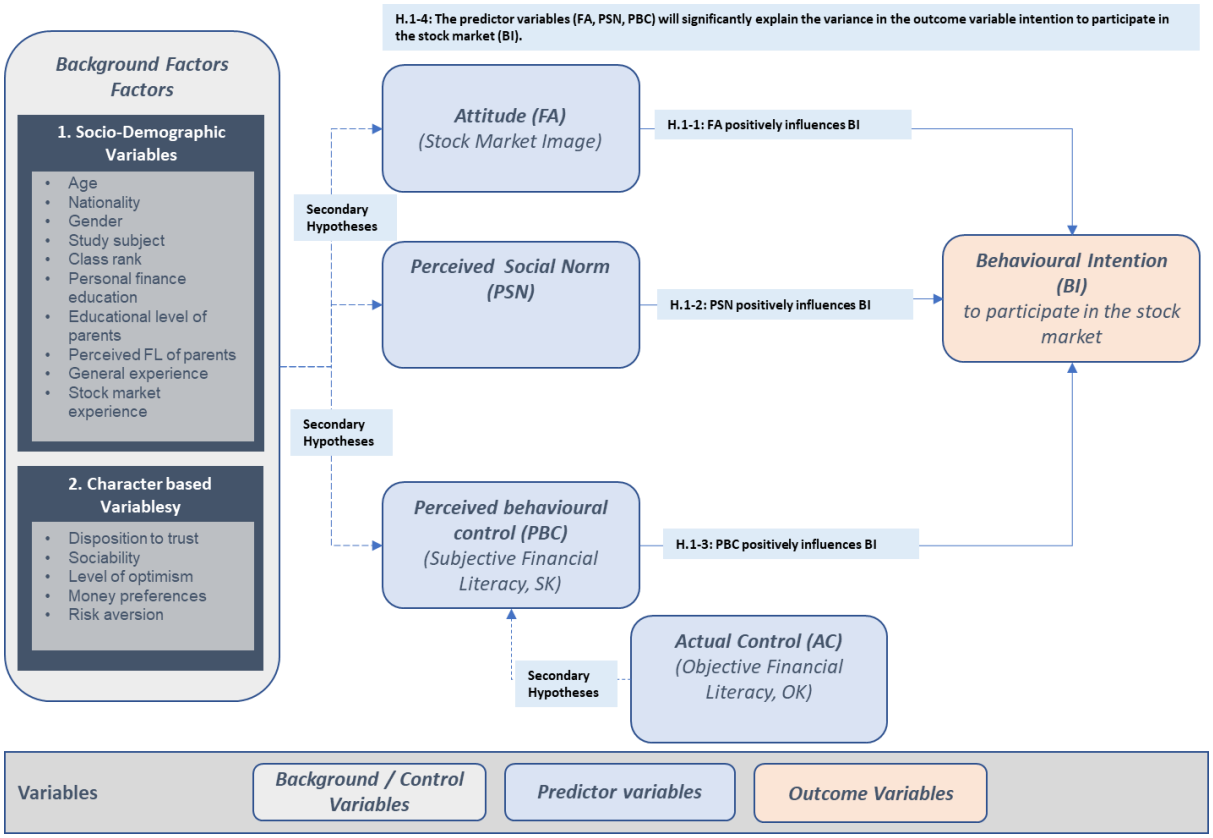
Source: Adapted from Edmondson and McManus (2007)

The research paradigm of positivism is most frequently associated with a deductive approach to theory development (Saunders et al., 2016, p. 136): based on what is known about a domain and the theoretical considerations within it, a hypothesis is deduced that must be subjected to empirical scrutiny (Bryman & Bell, 2015, p. 23). According to Creswell (2014b, p. 54), a theory in quantitative research is an interrelated set of variables formed into propositions or hypotheses that specify the relationship among variables. Therefore, consistent with the positivist research paradigm as well as a mature state of theory, a deductive approach to

theory development is most appropriate. The description of the research aim and the research hypotheses are outlined in sections 1.4 and 3.2.3 respectively.

To differentiate between the relevant variables conceptualised by the RAA and applied to the research at hand (see section 3.2.2) as well as the primary hypotheses to be tested (see section 3.2.3.1), the following deductive theory is stipulated and outlined in Table 41.

Table 41 – Deductive Theory: Relationships, Variables, and Primary Hypotheses



Source: own illustration

According to Bryman and Bell (2015, p. 23), in the deductive approach to theory development, the theory and hypotheses deduced come first and drive the data-gathering process. Consequently, section 3.3.3 outlines the specific research strategy to test the research hypotheses stipulated in section 3.2.3.

3.3.3 Research Strategy

The philosophical choices of a positivist research paradigm (sections 3.3.2.1 and 3.3.2.2) and a deductive approach (section 3.3.2.5) are generally associated with a quantitative research design (Bryman & Bell, 2015; Saunders et al., 2016). As outlined in section 3.2.3.1 the primary research aim can be defined by four hypotheses within the RAA framework context.

Based on these considerations and consistent with the recommended RAA approach (Fishbein & Ajzen, 2010), a cross-sectional survey strategy in the form of a web-based self-completion questionnaire was employed (see Table 42).

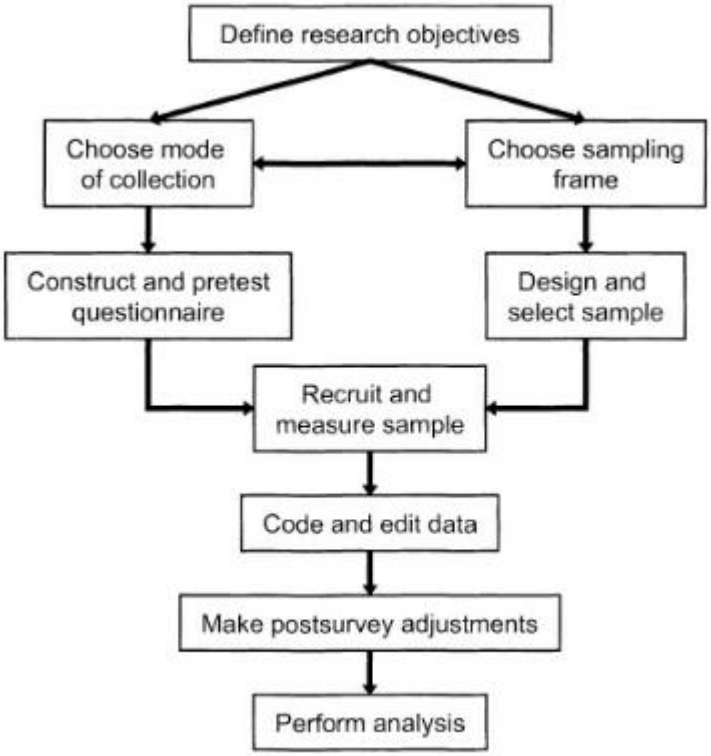
Table 42 – Summary of the Research Strategy

Purpose Statement	The purpose of this research is analyse factors predictive of behavioural intention to participate in the stock market by applying the RAA framework (Fishbein & Ajzen, 2010) to SMPP and consequently relating the predictor variables attitude (attitude to behaviour, FA), socialisation (perceived social norm, SPN), SK (perceived behavioural control, PBC) as well as OK (actual control, AC) to the behavioural intention to participate in stock markets (outcome variable, BI) for undergraduate students at a German university (Reutlingen University) while considering and controlling for socio-demographic and character-based variables.
Research Paradigm	**Positivism** Real, external reality / causal explanation and prediction / value-free research
Variables & Relation-ships	**Background Factors** *(Socio-Demographic and Character-Based)* → **Predictor Variables** *(FA, PSN, PBC)* → **Behavioural Intention BI** *(stock market participation)*
Deductive Theory Develop-ment	**Alternative Hypothesis H-1.1:** Stock market attitudes (FA) positively influence intention to participate in the stock market (BI).
	Alternative Hypothesis H-1.2: PSN positively influence intention to participate in the stock market (BI).
	Alternative Hypothesis H-1.3: PBC (SK) positively influence intention to participate in the stock market (BI).
	Alternative Hypothesis H-1.4: The predictor variables (FA, PSN, PBC) will significantly explain the variance in the outcome variable intention to participate in the stock market (BI).
Research Strategy	**Survey Design (Web-based Self-Completion Questionnaire)**

Source: Own illustration

The research project followed a quantitative approach based on survey methodology. A survey life cycle as a process, as stipulated by Groves et al. (2009), is depicted in Figure 2. Based on this process, the definition of the research objectives and the construction of the questionnaire (see Appendix C for the final instrument) are outlined in sections 1.4 and 3.2.2. The definition of the data collection methodology and the pre-testing procedures for the survey are explained in section 3.3.4, the approach to sample selection is covered in section 3.3.5, and the consideration of reliability and validity is presented in sections 3.3.6 and 3.3.7, respectively. Finally, the choice of data analysis techniques is explained in section 3.3.8 and ethical considerations are reviewed in section 3.3.9.

Figure 2 - Survey Process Life Cycle



Source: Groves et al. (2009, p. 48)

3.3.4 Data Collection Methods

3.3.4.1 Mode of Collection

Survey data are created at the time of the completion of the questionnaire and thus are a product of the data collection process (Groves et al., 2009, p. 149). Consequently, according to Groves et al. (2009), there are two basic issues that affect the choice of data collection method:

1) What is the most appropriate method to choose for a particular research question?
2) What is the impact of a particular method of data collection on survey errors and costs?

When evaluating the most appropriate method for a research project, the following issues need to be considered (Fowler, 2014, p. 61 et seq.): the approach and the basis on which the sample will be drawn. In the research study at hand, the sample was expected to be selected from a list of e-mail addresses of undergraduate students at Reutlingen University. Consequently, this consideration suggests that using a web-based collection method is appropriate (Fowler, 2014; Groves et al., 2009). Additionally, the computer, reading, and writing skills of the target population and their motivation to cooperate are salient considerations in choosing a mode of data collection (Fowler, 2014). According to Saunders

et al. (2016, p. 364), a web-based mediated questionnaire is appropriate when the population is computer literate and can be contacted by email or other electronic means. In the specific case of undergraduate students at Reutlingen University, this condition can be deemed to be satisfied. Furthermore, the question types utilised in the questionnaire require consideration: the application of an RAA-based questionnaire is – with the exception of the elicitation study (see section 3.3.4.2.1) – based on closed questions (see section 3.2.2 and Appendix C), which are deemed to be a suitable question format for web-based self-completion surveys (Fowler, 2014; Saunders et al., 2016).

Groves et al. (2009) consider the sampling frame, sampling implications, and coverage as potential sources of errors; as outlined in section 3.3.5, the sample frame and population were well defined and accessible, so these elements do not pose a significant risk of survey errors. Another aspect to consider is social desirability bias (i.e. the tendency of respondents to present themselves in a positive light), which might result in overreporting of socially approved behaviours and underreporting of socially disapproved behaviours (Groves et al., 2009, p. 167). A study by Tourangeau and Smith (1996) comparing methods of collecting survey data finds that the willingness of respondents to report sensitive behaviours (number of sex partners and use of illicit drugs) is increased by computer-assisted self-administration of the respective surveys. Although the subject matter in the research study at hand was not deemed to be of a similar sensitive nature to that in the study cited, self-administration of the survey appeared to be reasonable, particularly as this assured the privacy of the respondents and might increase their accuracy in answering performance-based questions (measurement of OK, see section 3.2.2.2.2) with “do not know” rather than guessing a response. Another relevant source of potential survey errors is the “response order effect”, referring to changes in the distribution of the answers as a result of changes in the order in which the possible answers are presented (Groves et al., 2009, p. 170). Schwarz, Strack, Hippler, and Bishop (1991) find that the order of ambiguous questions is relevant in interview situations but not under self-administrated conditions as respondents may use the content of preceding and subsequent questions for the purpose of disambiguation of the current question. For unambiguous questions, the order of questions is found to be relatively independent of the collection mode (Schwarz et al., 1991). Furthermore, in terms of costs, a web-based survey – based on the prevalence of existing survey software providers (such as the use of Qualtrics for this specific research) – is deemed to be the most economic option (Fowler, 2014; Groves et al., 2009; Saunders et al., 2016), particularly if a large sample is expected (Saunders et al., 2016). Based on this consideration, the collection mode of a self-completion, web-based questionnaire was thought to be appropriate.

3.3.4.2 Pilot Study

The purpose of a self-completion questionnaire pre-test is to evaluate the survey questions. Consequently, the pilot study relates to the test of the design of the self-completion questionnaire utilised in this study. As a general rule, all data-gathering methods should be tested and subjected to a pilot study (Quinlan, Babin, Carr, Griffin, & Zikmund, 2019). Similarly, Dawis (1987) underlines the importance of a pilot study for the purpose of ascertaining the functioning, understandability, and appropriateness of the questions for the respondent population. Pre-testing is the only way to determine in advance whether a questionnaire might cause problems for respondents (Groves et al., 2004, Chapter 1). Similarly, within the RAA framework, Fishbein and Ajzen (2010) emphasise the importance of a pilot questionnaire for the purpose of eliciting salient beliefs concerning attitude and normative referents. Consequently, the pilot study comprised a separate elicitation study (section 3.3.4.2.1) as well as the procedures for pre-testing the self-completion questionnaire (section 3.3.4.2.2.). Pilot studies seek to address three standards, as defined by Groves et al. (2009), that all survey questions should meet: these standards as well as the way in which the pilot study addressed them are summarised in Table 43 and further elaborated in the referenced sections.

Table 43 – Assessment of Survey Question Standards

Survey Question Standards	Purpose	Instruments utilized to address standard	Researcher Response	Section Reference
Content Standard	Are the questions asking about the right things?	- Focus Groups - Cognitive Interviews	For the Questionnaire Dimensions "Attitude" and "Normative Beliefs", the Content Standard is adressed in the context of the Elicitation Study. Furthermore, survey questions were to the extent possible taken from prior peer-reviewed research.	Elicitation Study (Section 3.3.4.2.1) Cognitive Interviews (Section 3.3.4.2.2) Source of Survey Questions (Section 3.2.2)
Cognitive Standard	Do respondents understand the questions consistently? Do the have the information required to answer them and are they willing and able to formulate answers to the questions?	- Cognitive Interview - Expert Reviews - Focus Groups - Behaviour Coding	The Cognitive Standard was adressed by the self-completion questionnaire pre-test which comprised an automated expert review utilizing the QUAID web tool to ensure clarity of survey questions. Furthermore, cognitive interview (N = 11) were carried out in the concurrent think aloud format as part of the pre-test. The cognitive interviews sought to identify the understanding as well as the answer formulation process of the respondents.	Pre-Test of Questionnaire (Section 3.3.4.2.2)
Usability Standard	Can respondents complete the questionnaire easily an as the were intended to? (This Standard is most relevant in self-completion questionnaires.)	- Purpose of overall field pre-test	The self-completion questionnaire utilizes an established survey software (Qualtrics). In the context of the questionnaire pre-test study, participants were encouraged to utilize their own IT equipment thus simulating also the process of questionnaire usability and identifying potential usability issues. Consequently, the cognitive interview procedures also served to address the usability standard.	Pre-Test of Questionnaire (Section 3.3.4.2.2)

Source: adapted from Groves et al. (2009, chapter 8)

3.3.4.2.1 Elicitation Study

The RAA framework requires behavioural (see section 3.2.1) and normative (see section 3.2.2.2.3) beliefs to be salient. In the RAA context, salience implies the notion of being readily accessible in memory, meaning that these beliefs are activated spontaneously without much cognitive effort (Fishbein & Ajzen, 2010, p. 98 et seq.). Consequently, the questionnaire needed to pinpoint these salient beliefs. For the purpose of eliciting the relevant salient beliefs, Fishbein and Ajzen (2010) recommend using a free response format, asking respondents to describe the attitude object as well as salient referents for a specific behaviour. Additionally, the elicitation study served to address partially the survey question content standard (refer to Table 43) for the covered dimensions. In the context of the pilot study, an elicitation questionnaire (see Appendix D) was distributed to a sample (N = 21) of Reutlingen University students, satisfying the requirement for a pilot study sample of approximately 5 to 15 participants (Quinlan et al., 2019). The items included in the elicitation questionnaire were adapted from Fishbein and Ajzen (2010, p. 451 et seq.) to the specific behaviour of SMP and are summarised in Table 44.

Table 44 – Elicitation Questionnaire Outline

Elicitation objective	Free-Response Format Item
Behavioural outcomes	• What positive attributes/adjectives do you associate with the stock market? • What negative attributes/adjectives do you associate with the stock market? • What do you see as advantages of investing in the stock market? • What do you see as disadvantages of investing in the stock market? • What else comes to mind when you think about investing in the stock market?

Normative referents	• When it comes to investing in the stock market, there might be individuals or groups who would think you should or should not perform this behaviour.
	  ○ Please list the individuals or groups who would approve or think that you should invest in the stock market going forward.
	  ○ Please list the individuals or groups who would disapprove or think that you should not invest in the stock market going forward.
	• Sometimes, when we are not sure what to do, we look to see what others in our social environment are doing.
	  ○ Please list the individuals or groups who are most likely to invest in the stock market.
	  ○ Please list the individuals or groups who are least likely to invest in the stock market.

Control factors	• Please list any factors or circumstances that would make it easy or enable you to invest confidently in the stock market. • Please list any factors or circumstances that would make it difficult or prevent you from confidently investing in the stock market.

Recruitment for the elicitation study was coordinated with Reutlingen University Business School's "Studentenbüro" (Students' Office). As the required number of candidates for the pilot

study was comparatively small, communication through the various faculties' informal student networks was deemed appropriate. The communication indicated the scope of the elicitation study and contained the detailed participant information. A EUR 15 voucher was offered as an incentive for participation[11]. The free-response elicitation questionnaire, which reiterated the participant information and included specific consent forms (see Appendix D), was administered via personalised email survey links in the survey software Qualtrics and completed individually by each participant. Completed elicitation questionnaires (N = 21) were coded in NVIVO and analysed for recurring salient beliefs. The results were utilised to validate the relevant content assumptions of the draft self-completion questionnaire and where appropriate to amend the draft. The themes emerging from the elicitation study are summarised in Table 45.

[11] All incentive schemes noted were self-funded by the researcher.For the pilot study 21 vouchers of EUR 15 (elicitation study) and 11 vouchers of EUR 25 (cognitive interviews) totalling EUR 590 were distributed.

Table 45 – Results of the Elicitation Study

Behavioural Outcomes	
Positive attributes associated with the stock market: • Opportunity (“Möglichkeit”) • Profit (“Gewinn”) • Long term (“langfristig”) • Fast (“schnell”) • Investing/investments (“investieren”)	Negative attributes associated with the stock market: • Risk/risky (“Risiko/riskant”) • Lose (“verlieren”) • Financial crisis (“Finanzkrise”) • Gambling (“Glücksspiel”)
Advantages of stock market investing: • Long term (“langfristig”) • Profits (“Gewinne”) • Wealth creation (“Vermögensaufbau”) • Make money (“Geld verdienen”)	Disadvantages of stock market investing: • Risk (“Risiko”) • Losses (“Verluste”) • Volatility • Knowledge requirements (“sich auskennen”) • Not safe (“nicht sicher”)
Normative Referents	
Individuals or groups who would approve of stock market investing: • Friends • Family • Professors • Banks • Knowledgeable persons	Individuals or groups who would disapprove of stock market investing: • Friends and acquaintances • Family • Persons with negative experiences (stock market losses) • Risk-averse persons
Individuals or groups who are most likely to invest in the stock market: • Family • Friends • Fellow students • Affluent persons • Knowledgeable persons • Financial services professionals	Individuals or groups who are least likely to invest in the stock market: • Persons with low income and/or low disposable capital • Older persons • Persons with insufficient stock market knowledge/know-how • Persons with a lower level of education
Control Factors	
Factors that would enable you to invest confidently in the stock market: • Relevant education/know-how (from schools and/or independent sources) • Unbiased financial advisor/banker/broker • Availability of capital and/or secure income • Low(er) risk/volatility	Factors that would prevent you from investing confidently in the stock market. • Insufficient knowledge/know-how • Insufficient capital and/or income • Political and stock market crises • Negative stock market experiences • Risk aversity

3.3.4.2.2 Pre-Test of the Self-Completion Questionnaire

According to Groves et al. (2009), survey question evaluation comprises two components: first, it seeks to address how well questions are understood or how difficult they are to answer; second, the question evaluation assesses how well the answers correspond to what is being

measured, that is, estimating the measurement error. This section will consider the first component, while the second component (assessment of measurement error) is addressed in sections 3.3.6 and 3.3.7). Consequently, the purpose of the pre-test is to assess question comprehension, difficulty in memory retrieval, and related issues primarily by observing people trying to understand and answer the draft questions (Groves et al., 2009), thus ensuring that the survey question standards (refer to Table 43 on page 108) are met. Groves et al. (2009) identify five different methods to evaluate draft survey questions systematically. These methods and their application to the survey question standards are summarised and assessed for this specific research study in Table 46. Based on this assessment, expert reviews and cognitive interviews (serving dually as a field pre-test) were deemed to be the most appropriate evaluation methods and will be discussed in the following sections.

Table 46 – Application of Survey Question Evaluation Methods

Survey Question	Scope	Survey Content Standard addressed			Utilized in context of Research Study?	Section Reference
		Content	Cognitive	Usability		
Expert Reviews	Expert reviews, in which subject matter experts review the questions to assess whether their content is appropriate for measuring the intended concepts, or in which questionnaire design experts assess whether the questions meet the three standards for survey question.	X	(X)	X	Yes. The draft survey was submitted to review with a subject matter expert (dissertation supervisor). Furthermore, the Question Understanding Aid QUAID webtool was utilized to perform an automated expert review.	3.3.4.2.2
Focus Group Discussions	Focus group discussions, in which the survey designers hold a semi-structured ("focused") discussion with members of the target population to explore what they know about the issues that the questionnaire will cover, how they think about those issues, and what terms they use in talking about them.	X	(X)		The Elicitation Study - using an open-ended question format - was utilized in the context of eliciting salient beliefs to inform the drafting of the final self-completion questionnaire.	3.3.4.2.1
Cognitive Interviews	Cognitive interviews, in which interviewers administer draft questions in individual interviews, probe to learn how the respondents understand the questions, and attempt to learn how they formulate their answers.	X	X		Yes. Cognitive Interviews (N = 11) were utilized in the concurrent think-aloud mode. All interviews were conducted by the principal researcher. Additional probing question were asked in case clarification on the cognitive processes was deemed necessary.	3.3.4.2.2
Field Pre-Tests	Field pretests are small-scale rehearsals of the data collection conducted before the main survey. Debriefings with the respondents may be held to enquire about problems they had in answering the survey		(X)	X	Yes. The Cognitive Interview Process also simulated the actual data collection process and thus served as rehearsal	3.3.4.2.2
Randomized Experiments	Randomized or split-ballot experiments, in which different portions of the pretest sample receive different wordings of questions attempting to measure the same thing.				No. Instruments utilized were largely drawn from prior research studies and question formats were utilized as reported. Additional questions followed the RAA wording recommendations. Understandability was tested by cognitive interviews.	Not applicable

Legend: X = addresses the Survey Content Standard directly, (X) = can make a contribution in assessing the Survey Content Standard

Source: Adapted from Groves et al. (2009, Chapter 8)

3.3.4.2.2.1 Expert Review

Expert reviews fundamentally comprise two dimensions according to Groves et al. (2009): a review of the draft instrument by subject matter experts to assess whether the content is appropriate for measuring the intended concepts and a review by questionnaire design experts to assess whether the questions meet the survey content standards outlined in Table 43. According to Graesser, Cai, Louwerse, and Daniel (2006), survey questions should elicit valid and reliable answers from respondents in a short amount of time as otherwise, if the respondents have trouble comprehending the questions, the goals of validity, reliability, and efficiency cannot be met. For that purpose, Graesser, Bommareddy, Swamer, and Golding (1996) utilise a computational model of human question answering to identify 12 key problems associated with survey question design, which are summarised in Table 47. Similar lists of problems are provided by other researchers (Lessler & Forsyth, 1996).

Table 47 – Summary of Major Survey Question Design Problems

Item	Category	Definition
1	**Unfamiliar technical term**	There is a word or expression of which very few respondents would know the meaning.
2	**Vague or imprecise relative term**	The values of a predicate (i.e., main verb, adjective, or adverb) are not specified on a scale that allows comparisons along a continuum.
3	**Vague or ambiguous noun phrase**	The referent of a noun phrase, noun, or pro- noun is unclear or ambiguous.
4	**Complex syntax**	The grammatical composition is embedded, dense, or structur- ally ambiguous.
5	**Working memory overload**	Words, phrases, or clauses impose a high load on immediate memory.
6	Misleading or incorrect presupposition	The truth-value of a presupposed proposition is false or inapplicable.
7	Unclear question category	It is difficult to determine what class of question is being asked.
8	Amalgamation of more than one question category	The question may be assigned to two or more different classes of questions.
9	Unclear question purpose	The respondent would not know why the question is being asked.
10	Mismatch between question category and answer option	The question invites one set of answer options that is different from the response options in the questionnaire.
11	Difficult to access specific or generic knowledge	A typical respondent would have difficulty recalling the information requested in the question.
12	Respondent unlikely to know answer (no information source)	A typical respondent would not know the information requested in the question.

Legend: Items marked bold are covered by QUAID.

Source: Graesser et al. (2006)

Based on the major design problems identified, a question understanding aid (QUAID) application was developed that critiques questions on five classes (items 1 through 5, marked in bold in Table 47) of comprehension problems (Graesser, Wiemer-Hastings, Kreuz, Wiemer-Hastings, & Marquis, 2000; Graesser et al., 2006) with the purpose of automating the detection and diagnosis of survey design problems. Evaluations by QUAID's designers reveal that survey methodologists revise questions with QUAID better than without QUAID (Groves et al., 2009). QUAID can potentially assist in designing, modifying, and evaluating questions on comprehension difficulty (Graesser et al., 2006) and thus constitutes an automated form of expert review (Groves et al., 2009). Consequently, the initial questionnaire draft instrument was reviewed utilising QUAID. Issues identified by QUAID were analysed regarding whether they constitute a potential comprehension problem for respondents. Based on this analysis, draft questions were revised and iteratively resubmitted to QUAID when deemed appropriate.

The remaining seven classes of potential problems (items 6 through 12 in Table 47) mainly constitute subject matter-related problems and were thus addressed in the context of the subject matter expert review. The subject matter expert review was conducted in the preparation phase of the pilot study by the researcher's supervisory team.

3.3.4.2.2.2 Cognitive Interviews

Cognitive interviewing is a technique based on protocol analysis (Ericsson & Simon, 1984; Groves et al., 2009) to assess survey questions. Whereas ordinary interviews focus on producing codable responses to questions, a cognitive interview concentrates on providing a view on the process elicited by the question (Presser et al., 2004). There is no single approach; rather, cognitive interviewing covers a broad range of procedures and approaches, which are summarised in Table 48.

Table 48 – Summary of Cognitive Interviewing Procedures

Item	Category	Procedure
1	**Concurrent think-alouds**	Respondents verbalize their thoughts while they answer a question.
2	**Retrospective think-alouds**	Respondents describe how they arrived at their answers either just after they provide them or at the end of the interview.
3	**Confidence Ratings**	Respondents assess their confidence in their answers.
4	**Paraphrasing**	Respondents restate the question in their own words.
5	**Definitions**	Respondents provide definitions for key terms in the questions.
6	**Probes**	Respondents answer follow-up questions designed to reveal their response strategies.

Source: Groves (2004)

For the cognitive interviews, student volunteers were recruited from Reutlingen University following the same recruitment approach as for the elicitation study (section 3.3.4.2.1). The recruitment communication indicated the scope of the cognitive interviews and contained detailed participant information, in particular clearly stating that the interviews would be audio taped. A EUR 25 voucher was offered as an incentive for participation, which, according to Groves et al. (2009), is typical. A total of 11 interviews (N = 11, 10 interviewees of whom met the inclusion criteria for the self-completion questionnaire) were performed by the researcher either on university campus premises or by Skype video call in the winter semester of 2018/2019. The distribution of the draft questionnaire mimicked the procedure to be followed for the final survey. The participants were encouraged to bring their own laptop. Consequently, the cognitive interviews also served as a usability field pre-test. During the interviews, the researcher was able to monitor the questionnaire displayed on the candidate's computer screen (either by wall projection in in-person interviews or by screen sharing in Skype).

The method followed for the interviews was concurrent thinking aloud. The candidates were clearly instructed at the beginning of their interview to verbalise instantly their thoughts

concerning the understanding of questions as well as the thought processes they used to arrive at the answer. The candidates were also encouraged to paraphrase the questions. In addition, the researcher utilised probing questions as well as think-aloud reminders if deemed appropriate. Finally, a short debriefing was performed (as suggested by Bryman & Bell, 2015), asking the candidates to state which questions or answer categories were unclear, ambiguous, or difficult to understand. Furthermore, the respondents were asked which questions appeared to be superfluous, redundant, or even possibly missing based on their subject matter understanding. The interviews were audio taped, transcribed, and coded in NVIVO by question. Any issues identified (in particular issues noted repetitively) were analysed and evaluated regarding whether the respective question, question instructions, and/or answer categories required clarification or amendment. Furthermore, usability issues were noted and amended accordingly. A cognitive interview transcript example (German language) is included in Appendix E.

3.3.4.3 Survey (Self-Completion Questionnaire)

As elaborated in section 3.3.4.1, a self-completion questionnaire was deemed to be the most appropriate form of data collection. The self-completion questionnaire (see Appendix C) was constructed based on consideration of the variables outlined in section 3.2.2 and assembled based on the existing survey elements, respectively, following the RAA survey question methodology suggested by Fishbein and Ajzen (2010). The self-completion questionnaire comprised 84 items (including instruction items) in 15 distinct sections, as elaborated in Table 49 and Appendix C. As appropriate (Saunders et al., 2016) for a web-based self-completion survey, all the questions – with the exception of clarification items for “other” or “not applicable” responses – were closed questions. Survey items based on previous research were utilised as far as possible if these instruments had been comprehensively published. The relevant sources for such items are specified in section 3.2.2 as well as Table 49.

The self-completion questionnaire was designed in the English language (source language) and translated into the German language (target language) based on the expectation that the Reutlingen student population comprises a significant number of international students who are more comfortable with the choice of an English language questionnaire. The source questionnaire was initially translated into the target language by a professional translation agency, as recommended by Groves et al. (2004). The initial translation was then quality checked by the principal researcher as well as a supervisor (both with the mother tongue of German). An additional German native speaker with a scientific background was asked to check the translation. Furthermore, the cognitive interview pre-test covered both the source language and the target language version.

The self-completion questionnaire was implemented using the survey software Qualtrics (www.qualtrics.com), conforming to GDPR requirements. The distribution process was coordinated with and approved by the Reutlingen University Data Security Officer. The email list based on the inclusion criteria (see section 3.3.5.1 and Appendix F) and containing only official university student email addresses was provided by Reutlingen University ESB Business School's administration. The distribution utilised Qualtrics's email functionality with individual links, which can only be used once, thus ensuring that the survey data are not compromised (i.e. by recipients forwarding the survey to other persons not in the study's scope). The respondent's name (derived from the email address) and the email from the contact list (as provided by Reutlingen University) were initially saved automatically with their survey data. Responses could be tracked and were utilised to send out reminders and thank you messages. Furthermore, the individual link automatically saved the respondents' data as they progressed through the survey. If respondents needed to leave the survey before finishing, they could return to it on any device. Consequently, the confidence that the right person responded to the survey was considered to be high (Saunders et al., 2016) due to these technical measures. Data were automatically scored based on the parameters defined in Qualtrics and downloadable as CSV or SPSS formatted files.

For a web-based self-completion questionnaire, a response rate of 10% or lower might reasonably be expected (Saunders et al., 2016). Taking into consideration the unsolicited nature and the absence of an inherent organisational participation incentive of this survey of university students, a low response rate was expected. Consequently, the measures adopted to increase the response rate are detailed in section 3.3.5.3. The reliability and validity of the survey instrument are considered in sections 3.3.6 and 3.3.7, respectively.

Table 49 – Survey Instrument: Structure Outline

Section*)	Sub-Section*)	Construct	Description	Number of Items	Variable Function	Variable Type	Based on
Q.1		**Participant Information and Informed Consent**	**Section contains reference to participant information, incentive participation instructions as well as informed consent confirmation.**	**3**	**N/A**	**Nominal**	**N/A**
Q.2		**Socio-Demographic Background Factors**	**Section contains questions to socio-demographic background factors. See details as per Sub-Section**	**21**	**Background**	**see details**	**N/A**
Q.2	*2*	*Age*	*Age range of the respondent*	*1*	Background	*Ordinal*	N/A
Q.2	*3*	*Sex*	*Sex of the respondent*	*1*	Background	*Nominal*	N/A
Q.2	*4*	*Nationality*	*Principal nationality of the respondent*	*1*	Background	*Nominal*	N/A
Q.2	*5*	*Undergraduate Degree Programme*	*Respondent is student in which Reutlingen University undergraduate degree programme*	*1*	Background	*Nominal*	N/A
Q.2	*7*	*Class Rank*	*Class rank (semester level) of respondent*	*1*	Background	*Ordinal*	N/A
Q.2	*8*	*Personal Finance Education*	*Personal Finance Education received prior to or during university studies as well as scope and provider of such education if answered yes.*	*4*	Background	*Nominal (Dichotomous)*	N/A
Q.2	*16*	*Financial Knowledge of Parents*	*Determination which parent handles money management (Ordinal) matters as well as assessment of financial knowledge (Scale)*	*7*	Background	*Ordinal & Scale*	N/A
Q.2	*17*	*Education Level of Parents*	*Education level of parents (2 scales for German education system as well as international students)*	*3*	Background	*Ordinal*	N/A
Q.2	*20*	*Living Arrangements*	*Living Arrangements of the respondent*	*1*	Background	*Nominal*	N/A
Q.2	*21*	*Principal Source of Financial Support*	*Current principal source of financial support of respondent*	*1*	Background	*Nominal*	N/A
Q.3		**Stock Market Experience**	**Prior or current experience of stock market investing**	**1**	**Background**	**Nominal (Dichotomous)**	**N/A**
Q.5		**Character based Background Factors**	**Sections containing character based construct assessments to belief statements on 7-point Likert scales.**	**4**	**Background**	**see details**	**see details**
Q.5	*2*	*Disposition to trust*	*3 belief statements on 7-point "Strongly agree - Strongly Disagree" scale to measure construct "Disposition to trust"*	*1*	Background	*Scale*	*adapted from Dobni & Racine, 2016; Naef & Schupp, 2009*
Q.5	*3*	*Sociability*	*5 social activities on 7-point frequency (Almost every day - Never) scale to measure construct "sociability".*	*1*	Background	*Scale*	*adapted from Dobni & Racine, 2016; Hong, Kubik, & Stein, 2004*
Q.5	*4*	*Level of optimism*	*6 belief statements on 7-point "Strongly agree - Strongly Disagree" scale to measure construct "Level of Optimism"*	*1*	Background	*Scale*	*adapted from Dobni & Racine, 2016; Scheier, Bridges, & Carver, 1994*
Q.5	*5*	*Money Preferences*	*3 belief statements on 7-point "Strongly agree - Strongly Disagree" scale + "Do not want to answer" option to measure construct "Money Preferences"*	*1*	Background	*Scale*	*adapted from Atkinson & Messy, 2012*
Q.6		**Risk Aversion**	**Questions assessing construct "risk aversion" as previously utilized in van Rooij et al., 2011**	**3**	**Background**	**Ordinal**	**van Rooij et al., 2011**
Q.7		**Perceived Behavioural Control (Subjective Financial Literacy)**	**Questions covering self-assessment of financial knowledge scored on a 7-point unipolar scale, self-assessment of knowledge application confidencescored on a 7-point unipolar scale, assessment of control beliefs on a 7-point unipolar scale, and a direct measure based on a 5-point Absolutely Sure – Not at all Sure scale to measure the degree of certainty that respondents feel concerning their prospects of success and adequacy of ability in the SMP context.**	**4**	**Predictor / Independent**	**Scale**	**N/A**
Q.9		**Attitude - Behavioural Beliefs**	**Sections containing behavioural belief statements on 7-point Likert scales.**		**Predictor / Independent**	**see details**	**see details**
Q.9	*2*	*Immorality*	*8 belief statements on 7-point "Strongly agree - Strongly Disagree" scale to measure construct "Stock Market - Immorality"*	*1*	*Predictor / Independent*	*Scale*	*Dobni & Racine (2015)*
Q.9	*3a*	*Facilitators / Regulators*	*3 belief statements on 7-point "Strongly agree - Strongly Disagree" scale to measure construct "Stock Market - Facilitators"*	*1*	*Predictor / Independent*	*Scale*	*adapted from Dobni & Racine (2015)*
Q.9	*3b*	*Facilitators / Regulators*	*5 belief statements on 7-point "Strongly agree - Strongly Disagree" scale to measure construct "Stock Market - Regulators"*	*1*	*Predictor / Independent*	*Scale*	*adapted from Dobni & Racine (2015)*
Q.9	*4*	*Economic Bellwether*	*4 belief statements on 7-point "Strongly agree - Strongly Disagree" scale to measure construct "Stock Market - Economic Bellwether"*	*1*	*Predictor / Independent*	*Scale*	*Dobni & Racine (2015)*
Q.9	*5*	*Wealth Creating Capacity*	*6 belief statements on 7-point "Strongly agree - Strongly Disagree" scale to measure construct "Stock Market - Wealth Creating Capacity"*	*1*	*Predictor / Independent*	*Scale*	*Dobni & Racine (2015)*
Q.9	*6*	*Fast Money*	*3 belief statements on 7-point "Strongly agree - Strongly Disagree" scale to measure construct "Stock Market - Fast Money"*	*1*	*Predictor / Independent*	*Scale*	*Dobni & Racine (2015)*
Q.9	*7*	*Tilted Playing Field*	*3 belief statements on 7-point "Strongly agree - Strongly Disagree" scale to measure construct "Stock Market -Tilted Playing Field"*	*1*	*Predictor / Independent*	*Scale*	*Dobni & Racine (2015)*
Q.10		**Attitude - Outcome Evaluation**	**Sections containing 7 behavioural outcome evaluation questions scored on a bi-polar 7-point "desirable – undesirable" scale relating to the 7 categories of Q.9 Attitude - Behavioural Beliefs**	**1**	**Predictor / Independent**	**Scale**	**adapted from Fishbein & Ajzen (2010)**
Q.11		**Attitude - Direct Measurement (Semantic Differential)**		**4**	**Predictor / Independent**	**Scale**	**adapted from Fishbein & Ajzen (2010)**
Q.11	*1*	*Personal Consideration of Stock Market*	*8 semantic differential pairs scored on a bi-polar 7-point scale to measure construct "Personal consideration of the stock market"*	*1*	*Predictor / Independent*	*Scale*	*adapted from Fishbein & Ajzen (2010)*
Q.11	*2*	*Personal Consideration of Stock Market Investing*	*5 semantic differential pairs scored on a bi-polar 7-point scale to measure construct "Personal consideration of the stock market investing"*	*1*	*Predictor / Independent*	*Scale*	*adapted from Fishbein & Ajzen (2010)*
Q.11	*3*	*Importance of Stock Market Investing for personal future*	*4 semantic differential pairs scored on a bi-polar 7-point scale to measure construct "Importance of stock market investing for respondent's future"*	*1*	*Predictor / Independent*	*Scale*	*adapted from Fishbein & Ajzen (2010)*
Q.11	*4*	*Personal Consideration of Financial Servicess Professionals*	*3 semantic differential pairs scored on a bi-polar 7-point scale to measure construct "Personal consideration of financial services professionals and their advice"*	*1*	*Predictor / Independent*	*Scale*	*adapted from Fishbein & Ajzen (2010)*
Q.12		**Perceived Norms**			**Predictor / Independent**	**see details**	**adapted from Fishbein & Ajzen (2010)**
Q.12	*2a*	*Injunctive Norm - Normative Belief*	*Assessment of respondents belief whether salient referents think he/she should invest in the stock market on a 5-point bi-polar "Strongly Approve - Strongly Disapprove" scale (with not applicable option for referent category)*	*1*	*Predictor / Independent*	*Scale*	*adapted from Fishbein & Ajzen (2010)*
Q.12	*2b*	*Injunctive Norm - Motivation to comply*	*Respondent's assessment of the importance of the normative belief on a 4-point unipolar "Highly Value - Do not Value" scale.*	*1*	*Predictor / Independent*	*Scale*	*adapted from Fishbein & Ajzen (2010)*
Q.12	*3*	*Descriptive Norm - Normative belief*	*Assessment of respondents belief whether salient referents themselves invest in the stock market on a 5-point bi-polar "Definitely Yes - Definitely No" scale (with not applicable option for referent category)*	*1*	*Predictor / Independent*	*Scale*	*adapted from Fishbein & Ajzen (2010)*
Q.12	*4*	*Peer, parental and educational socialisation*	*Respondent's assessment of frequency (7-point unipolar "Almost daily - Never" (with not applicable option) of relevant financial topic discussions with salient referents.*	*2*	*Predictor / Independent*	*Scale*	*N/A*
Q.13		**Actual Control (Objective Financial Literacy)**	**Performance measurement of respondents objective financial literacy utilizing 18 items.**	**18**	**Predictor / Independent**	**Scale**	**van Rooij et al., 2011 Knoll & Houts, 2012**
Q.4, Q.8, Q. 14		**Intention to Behaviour (Stock Market Participation)**	**Sections containing intermittent measurement of intention to behaviour on a dichotomous 7-point scale. See section reference for details.**	**7**	**Outcome / Dependent**	**see details**	**see details**
Q.4, Q.8, Q. 14	*1*	*Intention to Behaviour (Stock Market Participation)*	*Three (intermittent) measurements of respondent's Intention to Behaviour based on 7-point scales. Different question wording for respondents with and without stock market experience.*	*6*	*Outcome / Dependent*	*Scale*	*adapted from Fishbein & Ajzen (2010)*
Q. 14	*2*	*Objective of Stock Market Investing*	*Objectives for investing in the stock market (5-point Definitely Yes - Definitely No scale)*	*1*	*Outcome / Dependent*	*Scale*	*Dobni & Racine (2016)*
Q.15		**Closing & Participant Reconsent**	**Re-Consent of Participant that he/she is comfortable that anonymised answers will be collated for analysis and subsequent publication**	**1**	**N/A**	**N/A**	**N/A**

**) Section and Sub-Section Figures correspond to the Survey Question Numbering as outlined in Appendix C and thus are not consecutively numbered as instruction and clarification items are not listed.*

3.3.5 Sampling

3.3.5.1 Population

A key consideration of a quantitative study is to identify the unit of analysis (Creswell, 2014a), comprising the people and places to study. The study population was defined as encompassing all undergraduate students at Reutlingen University enrolled in the summer semester of 2019. The summary statistics provided by Reutlingen University Central Administration indicate a relevant undergraduate student population of 3,447. Reutlingen University is one of Germany's leading universities, offering international academic programmes with close ties to industry and commerce. On campus, the university has approximately 5,500 students spread across 5 different faculties: Applied Chemistry, Engineering, the ESB Business School, Informatics, and Textiles and Design (Reutlingen University, 2019). The detailed inclusion criteria as well as the undergraduate programmes in scope for the study are detailed in Appendix F. See section 3.3.5.3 below for the detailed data collection process.

3.3.5.2 Sample Size Determination

The purpose of the positivist, deductive research methodology is to generate theories and test them based on the hypothetical predictions of the underlying framework by applying statistical models (Field, 2013). The prediction of a hypothesis – called an alternative hypothesis – would be that an effect will be present. The null hypothesis is the alternative to the alternative hypothesis and usually states that an effect is absent (Field, 2013). Consequently, the sample size needs to be adequate to allow for null hypothesis significance testing. Hypotheses can be directional or non-directional, requiring a one-tailed or two-tailed test of significance. A one-tailed test is used when a directional alternative hypothesis is deemed appropriate by previous research (Creswell, 2014a). However, Lombardi and Hurlbert (2009), examining the use of one-tailed tests, conclude that directional prediction is never a valid justification for the use of one-tailed tests. They view the use of one-tailed tests as being appropriate only if results in the opposite direction of that predicted result with the same consequences are deemed non-significant. For specific psychological applications, Kimmel (1957) establishes three criteria for the appropriateness of utilising one-tailed tests, which are considered for the specific research context in Table 50, suggesting that a one-tailed test might be appropriate for this research study.

Table 50 – Appropriateness Assessment for the Use of One-Tailed Tests

No.	Criteria	Consideration for research study	Reference
1	Use a one-tailed test when a difference in the unpredicted direction, while possible, would be psychologically meaningless.	The RAA framework posits that the predictors influence the outcome variable BI. In this specific study, clear directional hypotheses are formulated that suggest that a positive FA, positive PSN as well as PBC will lead to a higher intention to participate in the stock market (i.e. a positive behavioural intention). The unpredicted direction would be meaningless and equivalent to a non-significant finding as there is no reasonable explanation why a negative predictor variable would have a positive impact on BI. For all practical purposes, this unpredicted direction would equal the absence of any effect (i.e. Null Hypothesis cannot be rejected.)	Chapter 3
2	Use a one-tailed test when results in the unpredicted direction will, under no conditions, be used to determine a course of behaviour different in any way from that determined by no difference at all.		
3	Use a one-tailed test when a directional hypothesis is deducible from psychological theory but results in the opposite direction are not deducible from coexisting psychological theory.	The literature review as well as prior research from RAA suggest the directional hypotheses as established. No relevant literature has been identified that would suggest that an opposite directional hypothesis might be deducible.	Chapter 2

Source: Criteria based on Kimmel (1957)

The primary hypotheses in accordance with the RAA framework and as established in section 3.2.3.1 posit that attitudinal, normative, and control considerations determine a person's intention, although it is conceivable that one or even two of the three basic determinants may not carry a significant weight in the prediction of intention (Fishbein & Ajzen, 2010, p. 179 et seq.). These considerations establish a clear directional nature within the RAA framework that is supported by a significant body of prior research (see section 3.2.1.2). Furthermore, the relevant SMP literature suggests that only a directional hypothesis is conceivable. An effect in the opposite, unpredicted direction would lead to the same result as non-rejection of the respective null hypothesis. Therefore, the use of one-tailed tests to establish statistical significance for the primary hypotheses (see Table 33 in section 3.2.3.1) was deemed appropriate.

Two error types require consideration when testing hypotheses. A Type I error occurs when the conclusion of an effect in the population is made when in fact no such effect exists. The conventional criterion (Field, 2013, p. 67) for the probability of a Type I error occurring is 5% ($\alpha = 0.05$), which was viewed as appropriate as this significance level is frequently applied in studies using multiple linear regression to test the RAA framework (compare Fishbein & Ajzen, 2010, p. 188). Since three primary predictor hypotheses (see section 3.2.3.1) were tested, a Bonferroni correction was made, yielding a corrected $\alpha = 0.01667$. The opposite to a Type I error is a Type II error, which occurs when the testing suggests that there is no effect when in reality there is an effect. The maximum acceptable probability of a Type II error occurring is suggested to be 20% ($\beta = 0.20$), taking into consideration the idea that a Type I error is four times as serious as a Type II error (Cohen, 1988; Field, 2013). Therefore, a probability of 20% ($\beta = 0.20$) was utilised for this research study, which translates into statistical power of 80%

(1 - β = 0.80), that is, the ability of the testing to find an effect (Field, 2013). To compute a required sample size by means of a power analysis, G*Power (version 3.1.9.4) was employed, as recommended by Field (2013, p. 70). Following a review of regression weights in studies utilising multiple linear regression to test the RAA (compare Fishbein & Ajzen, 2010, p. 188), for a full regression model including three RAA predictors (PSN, PBC, and FA), the R-square would be expected to range between 38.4% (multiple correlation R = 0.62) and 81.0% (R = 0.90), with a mean of 58.9%. For the a priori power analysis, the mean value of the expected R-square of 58.9% was adopted; thus, the expected residual variance of the model was expected to be 41.1% (1 – R-square = 0.411). The individual R-square contributions per RAA variable were set to be noted for a level of 2% (G*Power: "variance explained by special effect"), leading to a partial R-square of 0.0464 and an effect size f^2 of 0.049. The a priori power analysis assumed 3 tested predictors (PSN, PBC, and FA as per the primary hypotheses outlined in section 3.2.3.1) and a total of 20 predictors (including AC as well as the background variables; see Table 16), leading to a required sample size of 295 and actual power of 80.2% (see Table 51).

Table 51 – A Priori – Required Sample Size Calculation

Input:	Effect size f^2	=	0.048662
	α err prob	=	0.0167
	Power (1-β err prob)	=	0.8
	Number of tested predictors	=	3
	Total number of predictors	=	20
Output:	Noncentrality parameter λ	=	14.35523
	Critical F	=	3.468441
	Numerator df	=	3
	Denominator df	=	274
	Total sample size	**=**	**295**
	Actual power	=	0.801652

*Source: Calculation utilising G*Power based on the input factors outlined*

Based on the results of the data collection and regression analysis, as outlined in section 4.2.2.2.1, a post hoc power analysis was performed using the results of BI Regression Model 3 (see Table 118 in section 4.2.2.2.1). The three primary RAA predictors yielded a total R-square change contribution of 19.0% with a minimum R-square contribution of 2.9% (R-square change = 0.029)[12] and an overall regression model R-square of 58.1% (R-square = 0.581). With a sample size of N = 315, an actual power of 95.5% was achieved (see the calculation

[12] The R-square change achieved in order of predictors being entered into the regression model: FA 11.1%, PSN 4.9%, PBC 2.9%; all $p < 0.001$.

in Table 52). Assuming a one-tailed test due to the directional nature of the primary hypotheses, the error probability can be doubled, as only positive test statistics for the primary predictors were considered. Thus, the post hoc analysis was also computed with α = 0.033 and yielded power of 97.4% (see Table 53).

Table 52 – Post Hoc – Achieved Power Computation (Two-Tailed)

Input:	Effect size f^2	=	0.069212
	α err prob	=	0.0167
	Total sample size	=	315
	Number of tested predictors	=	3
	Total number of predictors	=	21
Output:	Noncentrality parameter λ	=	21.80191
	Critical F	=	3.464639
	Numerator df	=	3
	Denominator df	=	293
	Power (1-β err prob)	**=**	**0.954639**

*Source: Calculation utilising G*Power based on the input factors outlined*

Table 53 – Post Hoc – Achieved Power Computation (One-Tailed)

Input:	Effect size f^2	=	0.0692124
	α err prob	=	0.033
	Total sample size	=	315
	Number of tested predictors	=	3
	Total number of predictors	=	21
Output:	Noncentrality parameter λ	=	21.801906
	Critical F	=	2.951096
	Numerator df	=	3
	Denominator df	=	293
	Power (1-β err prob)	**=**	**0.9744276**

*Source: Calculation utilising G*Power based on the input factors outlined*

Consequently, a sufficient level of statistical power was achieved to support the null hypothesis testing.

3.3.5.3 Data Collection Process

Permission to conduct this study was obtained by means of an ethical review process that covered the pilot studies as well as the final questionnaire roll-out and included the signing off of the Reutlingen University research project supervisor (see Appendix G.1 for the ethical review submission form and Appendix G.2 for the favourable opinion). The relevant functions for the supervision of research activities at Reutlingen University were duly informed before the start of the study. Furthermore, the approach to data security and confidentiality was agreed with the university's data security officer. Based on this information, on 22 March 2019,

the university's business school administration provided the email distribution list for all relevant undergraduate programmes as of the Summer Semester 2019, comprising 4,069 university email addresses. In accordance with the agreed data security requirements, the list contained only email addresses. No additional demographic information (such as gender, age, or study programme) was provided for each student. Summary statistics of the relevant student population on salient socio-demographic variables (distribution by gender, class rank, nationality, and study programme) were provided separately by the university administration. Consequently, the population statistics could not be verified independently. The summary statistics provided by Reutlingen University Central Administration are based on a relevant undergraduate student population of 3,447 at the time of the survey. The difference in the number of email addresses in the email distribution list can be explained by an inaccurate email list that also included students who were currently abroad. However, it was confirmed that all eligible students were included in the email list. Therefore, for further analysis, the statistics provided by Reutlingen University Central Administration were utilised.

Due to the availability of the complete population contact details, a census distribution of the web-based self-completion questionnaire to all the email addresses was deemed appropriate, taking into consideration that this form of distribution might result in a low response rate of 10% or lower (Saunders et al., 2016). The distribution commenced on 27 March 2019, utilising the Qualtrics email distribution facility. Due to issues with the acceptance of such a high number of emails from a single source by the Reutlingen University firewall, the initial distribution had to be repeated on 4 April 2019. A total of four reminders were distributed in the time frame from 9 April to 9 May 2019, taking into account the fact that the Easter holidays fell within this time frame. Examples of the email for initial distribution as well as the reminder email are provided in Appendix H.

In total, 452 questionnaires were started (reaction rate of 13.1%) by at least clicking on the Qualtrics questionnaire link. Of these, N = 315 questionnaires were completed and were considered for analysis (response rate of 9.14%). Overall, 69.7% of commenced questionnaires were completed. An analysis of non-completed questionnaires (N = 137) indicated that approximately 55.5% (N = 76) of respondents broke off questionnaire completion more or less immediately. Only 13 (9.5%) non-completed questionnaires proceeded further than 50% of questionnaire completion before termination. As the obtained sample of N = 315 satisfied the minimum a priori computed sample size requirements (see section 3.3.5.2), no further reminders were sent out and the data collection was completed on 10 May 2019.

For a web-based self-completion questionnaire, a low response rate of 10% or lower might reasonably be expected (Saunders et al., 2016). To address the risk of a low response rate, offering an extrinsic benefit for participation is found to increase cooperation rates in surveys (Singer, 2002). According to Groves et al. (2009, p. 206), cash incentives tend to be more powerful than in-kind incentives of a similar value. In terms of the impact on the representativeness of the sample, evidence exists (Groves et al., 2006) that, when an incentive is offered, it disproportionately improves the participation of persons who are less interested in the topic. Groves et al. (2009, p. 206) point out that, without an incentive, the respondents consist of those who are interested in the topic (and often report different attributes to the key variables) while, with an incentive, the respondent pool better reflects the full population. For the research at hand, the risk of overrepresentation of business school students in the survey due to their inherent interest in business topics such as stock markets was identified. However, as the objective of the survey was to obtain a cross-section of the entire eligible student population across all faculties, an incentive scheme was deemed appropriate to motivate the participation of students (i.e. non-business school students) who might not have an intrinsic motivation or inclination to participate based on the subject matter of the survey. Consequently, participants were offered a EUR 15 electronic Amazon voucher for successful completion of the questionnaire (limited to a maximum of 300 vouchers[13]). Amazon vouchers were selected due to the simplicity of sending them and the expectation that they would hold universal appeal due to the vast range of products and services available. Furthermore, the ability to send the voucher electronically ensured that no additional personal data (e.g. postal addresses) needed to be collected, thus enhancing the data protection. Participants had to reconfirm their email address explicitly, thus consenting to its use for the purpose of sending the voucher electronically. The response rate of 9.14% (315 valid questionnaires out of an eligible population of 3,447 students) lies within the range stipulated for this type of distribution method (Saunders et al., 2016). Table 54 outlines a comparison of demographic factors between the overall eligible undergraduate student population based on aggregate information provided by Reutlingen University's administration[14] and the sample obtained, which is a reasonable approach to ascertain the presence of non-response bias (Armstrong & Overton, 1977). A comparison of the characteristics (see Table 54) suggests that the sample appropriately reflects the demographic characteristics of the underlying population and can thus be considered to be representative of the population.

[13] The incentive scheme was self-funded by the researcher. Based on email addresses reconfirmed by participants, a total of 275 vouchers amounting to EUR 4'125 were distributed to survey respondents.
[14] Due to the data protection requirements, no additional details were provided.

Table 54 – Comparison of Demographic Variables between Sample and Underlying Population

	Population (N = 3'447)	Sample (N = 315)
Distribution by Business vs. Non-Business Students	**%**	**%**
Business Students	39.0%	39.7%
Non-Business Students	61.0%	60.3%
Total	100.0%	100.0%
Distribution by Sex	**%**	**%**
Male	58.8%	54.3%
Female	41.2%	45.7%
Prefer not to say	0.0%	0.0%
Total	100.0%	100.0%
Distribution by Nationality	**%**	**%**
German students	81.1%	84.4%
International students	18.9%	15.6%
Total	100.0%	100.0%
Distribution by Class Rank	**%**	**%**
Semester 1	10.9%	9.8%
Semester 2	19.1%	17.1%
Semester 3	8.7%	7.0%
Semester 4	16.1%	17.1%
Semester 5	7.9%	6.7%
Semester 6	17.1%	16.8%
Semester 7	8.4%	10.8%
Semester 8+	11.8%	14.6%
Total	100.0%	100.0%

To assess the non-response bias further, a multiple group mean comparison was conducted, which split the obtained sample into two halves based on the survey meta-data "EndDate" of questionnaire completion, as recorded by Qualtrics, and compared the means (t-Test) for the composite scores of the RAA predictor variables, TOK and BI. This is a useful extrapolation method based on the assumption that subjects who respond later and less readily are more like non-respondents (Armstrong & Overton, 1977). No statistically significant differences in the means compared were noted (Levene's test for equality of variances based on the 95% confidence interval), which further supports the conclusion that the non-response bias was low.

3.3.6 Reliability

Reliability refers to a measurement of the variability of answers over repeated conceptual trials and thus addresses the question of whether respondents are consistent or stable in their answers (Groves et al., 2009). Reliability suggests that a measure should consistently reflect the construct that it is measuring (Field, 2013). Table 55 outlines the different types of reliability

that require consideration based on the specific research methodology applied. Based on the assessment of the types of reliability and when they apply, the focus of the reliability test for this research was on *internal consistency reliability*, as there was one version of the instrument (self-completion questionnaire, see Appendix C) that was administered once to each participant in the study (see section 3.3.5.3).

Table 55 – Types of Reliability

Form of Reliability	Number of Times Instrument Was Administered	Number of Different Versions of the Instrument	Number of Individuals Who Provided Information
Test–retest reliability	Twice at different time intervals	One version of the instrument	Each participant in the study completes the instrument twice
Alternate forms reliability	Each instrument administered once	Two different versions of the same concept or variable	Each participant in the study completes each instrument
Alternate forms and test–retest reliability	Twice at different time intervals	Two different versions of the same concept or variable	Each participant in the study completes each instrument
Interrater reliability	Instrument administered once	One version of the instrument	More than one individual observes the behaviour of the participants
Internal consistency reliability	Instrument administered once	One version of the instrument	Each participant in the study completes the instrument

Source: Adapted from Creswell (2014a)

Internal consistency reliability applies to multiple indicator measures in which each respondent's answers to a specific construct are aggregated to form an overall score (Bryman & Bell, 2015). The simplest test is split-half reliability, which splits multi-measure indicators into two randomly selected sets of items and establishes whether a respondent's score for one half is similar to the score for the other half (Field, 2013). The Cronbach's α coefficient, which calculates the average of all possible split-half reliability coefficients, is the most common measure of internal consistency reliability (Bryman & Bell, 2015; Creswell, 2014a; Field, 2013) and was used to test for reliability.

Coefficient α values range from 0, indicating no internal consistency, to 1, indicating perfect internal consistency. According to Quinlan et al. (2019), an α value above 0.80 is considered to have very good reliability, scales with a coefficient between 0.70 and 0.80 are considered to have good reliability, and scales with a coefficient between 0.60 to 0.70 indicate fair reliability. However, Kline (2000; cited in Field, 2013) states that, when dealing with psychological constructs (such as the RAA predictor variables), values below 0.7 can be

expected because of the diversity of the constructs being measured. Furthermore, Pedhazur and Schmelkin (1991) posit that strict adherence to the general rules of thumb might not be beneficial as it distracts from the interpretation of the actual value in the specific research context.

Table 56 presents a summary of the reliability test containing the Cronbach's α calculation for the multiple indicator measures utilised. The Cronbach's α coefficients noted previously in the literature for the same measures are also reported. In accordance with Cronbach (1951), for constructs that were composed of sub-scales (such as the predictor variable "attitude"), the α coefficient was calculated separately for each sub-scale. For information purposes and where deemed appropriate, an α coefficient was also calculated on the construct level. The α coefficient calculation on the sub-scale level was more conservative as the α value tended to increase with the number of items included in the calculation (Cortina, 1993). In general, the scales utilised in the research possess a consistently adequate α coefficient in excess of 0.60 (with the exception of Q.9.6 Fast Money, reporting 0.552). For the primary hypotheses' predictor variables (FA, PBC, and PSN) as well as the outcome variable (BI), the α coefficient is in excess of 0.80, being indicative of a high degree of internal reliability. Only for PSN does the α coefficient register a lower value between 0.587 and 0.841 for the sub-scale. This is plausible as the internal consistency between evaluations of different salient referents might not be high (i.e. it is not unreasonable to expect that a respondent might evaluate the injunctive and descriptive norms for two salient referents completely differently, thus leading to a comparatively lower correlation and α coefficient between individual measures). Overall, the reliability test based on the calculation of Cronbach's α combined with the prior Cronbach's α values reported in the literature (see Table 56) supports the conclusion that the multi-measure constructs are adequately reliable.

Table 56 – Reliability Test (Cronbach's α Coefficient)

Section*)		Construct	Number of Measures	Variable Function	Cronbach's α (calculated)		Cronbach's α (Reported in Literature)		Cronbach's α reported in:
Q.5		**Character based Background Factors**		**Background**					**see details**
Q.5	*2*	*Disposition to trust*	*3*	Background	*0.755*		*0.660*		*Naef & Schupp, 2009*
Q.5	*3*	*Sociability*	*5*	Background	*0.619*		*N/A*		*N/A*
Q.5	*4*	*Level of optimism*	*6*	Background	*0.717*		*0.820*		*Scheier, Bridges, & Carver, 1994*
Q.5	*5*	*Money Preferences*	*3*	Background	*0.747*		*N/A*		*N/A*
Q.7		**Perceived Behavioural Control (Subjective Financial Literacy)**	**12**	**Predictor / Independent**	**0.924**		**N/A**		**N/A**
Q.7	*2*	*Control Beliefs*	*3*	*Predictor / Independent*	*0.728*		*N/A*		*N/A*
Q.7	*3*	*Self-Assessment of Financial Knowledge*	*4*	*Predictor / Independent*	*0.876*		*N/A*		*N/A*
Q.7	*4*	*Perceived Behavioural Control (Comfort level)*	*3*	*Predictor / Independent*	*0.767*		*N/A*		*N/A*
Q.7	*5*	*Perceived Behavioural Control (Certainty level)*	*2*	*Predictor / Independent*	*0.681*		*N/A*		*N/A*
Q.9		**Attitude - Behavioural Beliefs**							
Q.9	*2*	*Immorality*	*8*	*Predictor / Independent*	*0.807*	*1)*	*0.851*		*Dobni & Racine (2015)*
Q.9	*3a*	*Facilitators*	*3*	*Predictor / Independent*	*0.810*	*2)*	*0.876*	*4)*	*Dobni & Racine (2015)*
Q.9	*3b*	*Regulators*	*5*	*Predictor / Independent*	*0.698*	*3)*			
Q.9	*4*	*Economic Bellwether*	*4*	*Predictor / Independent*	*0.608*	*5)*	*0.790*		*Dobni & Racine (2015)*
Q.9	*5*	*Wealth Creating Capacity*	*6*	*Predictor / Independent*	*0.792*	*6)*	*0.806*		*Dobni & Racine (2015)*
Q.9	*6*	*Fast Money*	*3*	*Predictor / Independent*	*0.552*	*7)*	*0.557*		*Dobni & Racine (2015)*
Q.9	*7*	*Tilted Playing Field*	*3*	*Predictor / Independent*	*0.602*	*8)*	*0.568*		*Dobni & Racine (2015)*
Q.10		**Attitude - Outcome Evaluation**	**8**	**Predictor / Independent**	**0.628**		**N/A**		**N/A**
Q.11		**Attitude - Direct Measurement (Semantic Differential)**	**20**	**Predictor / Independent**	**0.884**		**N/A**		**N/A**
Q.11	*1*	*Personal Consideration of Stock Market*	*8*	*Predictor / Independent*	*0.821*		*N/A*		*N/A*
Q.11	*2*	*Personal Consideration of Stock Market Investing*	*5*	*Predictor / Independent*	*0.708*		*N/A*		*N/A*
Q.11	*3*	*Importance of Stock Market Investing for personal future*	*4*	*Predictor / Independent*	*0.839*		*N/A*		*N/A*
Q.11	*4*	*Personal Consideration of Financial Servicess Professionals*	*3*	*Predictor / Independent*	*0.792*		*N/A*		*N/A*
Q.12		**Perceived Norms**		**Predictor / Independent**					**adapted from Fishbein & Ajzen (2010)**
Q.12	*2a*	*Injunctive Norm - Normative Belief*	*9*	*Predictor / Independent*	*0.776*	*9)*	*N/A*		*N/A*
Q.12	*2b*	*Injunctive Norm - Motivation to comply*	*9*	*Predictor / Independent*	*0.784*	*10)*	*N/A*		*N/A*
Q.12	*3*	*Descriptive Norm - Normative belief*	*7*	*Predictor / Independent*	*0.587*		*N/A*		*N/A*
Q.12	*4*	*Peer, parental and educational socialisation*	*7*	*Predictor / Independent*	*0.841*		*N/A*		*N/A*
Q.13		**Actual Control (Objective Financial Literacy)**	**18**	**Predictor / Independent**	**0.882**		**N/A**		**N/A**
Q.13	*02-06*	*Basic Objective Financial Literacy*	*5*	*Predictor / Independent*	*0.776*		*N/A*		*N/A*
Q.13	*07-19*	*Advanced Objective Financial Literacy*	*13*	*Predictor / Independent*	*0.863*		*N/A*		*N/A*
Q.4, Q.8, Q. 14		**Intention to Behaviour (Stock Market Participation)**	**3**	**Outcome / Dependent**	**0.913**		**N/A**		**N/A**

1) amounts to 0.807 if calculated on bi-polar scale with "Do not understand" values (N=67) excluded.
2) amounts to 0.810 if calculated on bi-polar scale with "Do not understand" values (N=5) excluded.
3) amounts to 0.698 if calculated on bi-polar scale with "Do not understand" values (N=89) excluded.
4) Dobni & Racine (2015) report a single α value for Facilitators & Regulators. The corresponding calculated α amounts to 0.751 if calculated on a bi-polar scale with "Do not understand" values (N=89) excluded and 0.690 on a unipolar scale.
5) excludes N=13 respondents that answered "Do not understand the statement".
6) amounts to 0.792 if calculated on bi-polar scale with "Do not understand" values (N=42) excluded.
7) amounts to 0.552 if calculated on bi-polar scale with "Do not understand" values (N=6) excluded.
8) amounts to 0.602 if calculated on bi-polar scale with "Do not understand" values (N=9) excluded.
9) with N=142 of respondents excluded due to one or multiple N/A answers
10) with N=177 of respondents excluded due to one or multiple N/A answers
**) Section and Sub-Section Figures correspond to the Survey Question Numbering as outlined in Appendix C.*

3.3.7 Validity

Reliability, as established in section 3.3.6, is a necessary but not sufficient condition for validity as a reliable scale may not be valid (Bryman & Bell, 2015; Field, 2013; Quinlan et al., 2019). The fundamental issue in survey research as well as the analysis of psychological measures is "construct validity" (Groves et al., 2009; Krosnick et al., 2005), which is deemed to exist when a measure reliably measures and truthfully represents a unique concept (Quinlan et al., 2019). Construct validity consists of several components (Quinlan et al., 2019), which are summarised in Table 57. Pedhazur and Schmelkin (1991) emphasise that, while a classification of validity types is convenient for discussion purposes, it does not imply a set of mutually exclusive and exhaustive types of validity.

Table 57 – Components of Construct Validity

Components of Construct Validity	Definition
Face Validity	A scale's content logically appears to reflect what was intended to be measured
Content Validity	The degree to which a measure covers the breadth of the domain of interest
Criterion Validity	The ability of a measure to correlate with other standard measures of similar constructs or established criteria
Convergent Validity	Concepts that should be related to one another are, in fact, related; highly reliable scales contain convergent validity
Discriminant Validity	Represents the uniqueness or distictiveness of a measure; a scale should not correlate too highly with a measure of a different construct

Source: adapted from Quinlan et al. (2019)

AERA, APA, and NCME (2014) define five broad categories of evidence that serve to establish validity. These categories of evidence are outlined in Table 58.

Table 58 – Types of Validity Evidence

Validity Evidence	Type of Evidence sought	Examples of Evidence
Evidence based on instrument content	Evidence of an analysis of the instrument's content (e.g. themes, wording, format) and the construct it is intended to measure	- Examine logical or empirical evidence - Have experts in the area judge
Evidence based on response processes	Evidence of the fit between the construct and how individuals taking the instrument actually performed	- Interviews with individuals answering instruments to report what they experienced / were thinking - Interviews or other data with observers to determine if they are all responding to the same stimulus in the same way
Evidence based on internal structure	Evidence of the relationship among instrument items, instrument parts and the dimensions of the instrument	- Statistical analysis to determine if factor structure (scales) relates to theory, correlation of items
Evidence based on relations to other variables	Evidence of the relationship of instrument scores to variables external to the instrument	- Correlations of scores with instruments measuring the same or different constructs (convergent/discriminant validity) - Correlations with scores and some external criterion - Correlations of test scores and their prediction of a criterion based on cumulative databases (meta-analysis)
Evidence based on the consequences of testing	Evidence of the intended and unintended consequences of the test	Benefits of the test for positive treatments for therapy, for placement of workers in suitable jobs, etc.

Source: adapted from AERA et al. (2014) and Creswell (2014a)

Taking account of validity as a unitary concept (Pedhazur & Schmelkin, 1991), the evidence for validity in the context of this research was considered throughout all the research phases by taking account of all the construct validity components (Table 57) as well as the types of validity evidence (Table 58), resulting in the construct validity evidence matrix summarised in Table 59. Face and content validity were established either by basing the instruments on instruments reported and utilised in the previous literature or by following the instrument design methodology established (see Fishbein & Ajzen, 2010) for the RAA framework. Face validity and content validity were further confirmed by the pilot study and expert review procedures. Criterion validity was confirmed by the primary hypothesis testing, while convergent and discriminant validity were examined by means of the reliability test (convergent validity) and the correlation analysis (discriminant validity).

Table 59 – Construct Validity Evidence Matrix

Components of Construct Validity	Evidence obtained based on				Description of Evidence obtained	Section Reference
	Test Content	Response processes	Internal Structure	Relation to other variables		
Face Validity	X	X			Face and content validity were examined by means of the expert review as well as in particular by the pilot studies (cognitive interviews and elicitation study).	3.3.4.2
Content Validity		X				
Criterion Validity			X	X	The research is predicated on application of the RAA framework and testing of directional hypotheses. Consequently, the signficance of the hypothesis testing results comprises evidence on criterion validity of the dimensions covered in the instrument.	3.2.2 & 4.2
Convergent Validity			X	X	Convergent calidity was tested by means of the reliability test establishing an adequate degree of reliability across all relevant instrument dimensions.	3.3.6
Discriminant Validity			X	X	Discriminant validity was tested by means of correlation analysis. Results indicate that only constructs that were expected to be related to each other were in fact related.	4.2

3.3.8 Data Analysis Techniques

Data analysis of the responses obtained from the survey was conducted using the IBM Statistical Package for the Social Sciences (SPSS), version 25. The following statistical methods were applied:

- Calculation of Cronbach's alpha to assess the reliability of the survey instrument
- Independent T-test to assess the non-response bias in the sample
- Frequencies and measures of dispersion (mean, median, mode, and standard deviation) to describe the study sample
- Bivariate statistics (Pearson's correlation coefficient and the coefficient of determination) to analyse associations between relevant variables
- Multiple linear regression for null hypothesis testing

3.3.9 Ethical Considerations

As the research was conducted by means of a self-completion questionnaire following two pilot studies, the research methodology needed to address potential ethical issues. The ethics concern focuses on informing and protecting respondents (issues adapted from Fowler, 2014, Chapter 11). The issues and the practitioner response are summarised in Table 60 and served to minimise the ethical risks. The research was conducted in accordance with the ethical standards of the University of Portsmouth. A formal ethics review was performed, and a favourable ethics opinion was obtained (see Appendices G.1 and G.2).

Table 60 – Ethical Considerations

Ethical Issue	Description of Issue	Practitioner Response
Informing respondents	The survey research process generally involves enlisting voluntary cooperation. It is a basic premise of ethical survey research that respondents should be informed about what it is that they are volunteering to undertake. Respondents should have the following information before being asked to answer questions: 1. The name of the organisation that is carrying out the research. 2. The sponsor who is supporting or paying for the research. 3. A reasonably accurate, though brief, description of the purposes of the research. 4. An accurate statement of the extent to which answers are protected with respect to confidentiality. 5. Assurance that cooperation is voluntary and that no negative consequences will result for those who decide not to participate in the survey study.	For the pilot studies as well as the self-completion questionnaire, the participants were presented with the relevant information in detail (see Appendices D and H); this information was included in the cover email sent to all students. A link to the participant information was provided at the beginning of the self-completion questionnaire, including explicit informed consent confirmation (see Appendix C, Q 1.2). Without this consent, the participant could not advance to the actual survey. Furthermore, the questionnaire respondents reconfirmed their consent at the end of the questionnaire (see Appendix C, Q. 15.1).
Protecting respondents (I)	If a sample is drawn from a list, such as members of an insurance plan or employees of an organisation, one very basic tenet of ethical research is that sample members' lives should not be adversely affected in any way by whether or not they agree to participate.	The sample was based on the undergraduate programme enrolment at Reutlingen University. Participation was elicited by email invitation and was voluntary. The information on whether students participated (and any answers submitted) or did not participate was processed by the principal investigator utilising Qualtrics survey software, which conforms to the GDPR requirements, and was not shared with any Reutlingen University officials. Consequently, participation or non-participation will not affect the respondents in the context of their studies at Reutlingen University. Furthermore, any data that might directly identify the survey

Ethical Issue	Description of Issue	Practitioner Response
		respondents was eliminated from the analysis file. Only the principal investigator has full access rights to the complete data set.
Protecting respondents (II)	Respondents' identity requires protection. Researchers should be aware of the risk of demographic data and substantial qualitative data identifying the respondent.	The questionnaire did not seek personal identifying data from the respondents beyond their name, university email address, and study programme. Furthermore, the questionnaire asked for gender, nationality, and year of birth. It is theoretically possible that individual respondents could be identified from a combination of these factors (e.g. the only student coming from a certain country). To protect the identity in these instances, the survey data were analysed in block form rather than individually and the presentation of the results ensured that group aggregations were sufficiently large that no individual's identity can be derived from them.
Benefits for the respondents	As the use of cash incentives to participate is becoming more common, concern has arisen that incentives should not be so large that it becomes unreasonably difficult for some respondents, particularly those in financial distress, to say "no". Benefits should not be so great as to undermine the principle that research participation is a voluntary act; they should not be large enough to be potentially coercive.	The study sought to incentivise survey respondents by offering a benefit in the form of an online voucher (EUR 15 per respondent). The amount appeared to be reasonable considering the ethical issue outlined and the fact that the survey was expected to require 30–45 minutes to complete. The incentive amount was deemed to offer fair compensation for the time requirement; however, it was not so large that there was a perceived concern that people may be induced to take part against their better judgement. Furthermore, receipt of the incentive was not connected with any specific requirements other than completion of the survey (participation in the pilot study, respectively). Furthermore, the invitation letter clearly specified that the incentive was not a formal payment but rather a token of appreciation for participation.

Source: Issues adapted from Fowler (2014, Chapter 11)

3.3.10 Summary

Section 3.3 outlined the research methodology. Considering the positivist research paradigm, the deductive approach to theory development, and the methodological fit with the research (Edmondson & McManus, 2007) as well as prior research applying the RAA as a theoretical framework (see section 3.2.1), a quantitative research strategy based on a survey (web-based self-completion questionnaire) was selected. Subsequent to pilot studies to obtain relevant input for the survey construction (elicitation study) as well as the pre-testing of the questionnaire by means of expert review and cognitive interviews, the questionnaire was distributed by census distribution to all eligible undergraduate students at Reutlingen University. A sample of N = 315 completed questionnaires was obtained. As reviewed in this chapter, the survey instrument was found to be reliable and the sample obtained provided sufficient statistical power to facilitate the hypothesis-testing analysis in Chapter 4 (section 4.2). The subsequent Chapter 4 will describe and explore the data set obtained by means of descriptive statistical analysis (section 4.1), outline the results of hypothesis testing utilizing bivariate and multivariate statistical analysis (section 4.2) as well as discuss the findings (section 4.3).

4 Survey Analysis and Findings

4.1 Descriptive Statistical Analysis

4.1.1 Introduction

As outlined in Chapter 3.3, this research is based on a positivist research paradigm and consequently is deductive in nature since the application of the RAA facilitated the development of a number of testable hypotheses (section 3.2.3) in relation to the outcome variable "intention to participate in the stock market" (BI), for which empirical data were collected. Univariate statistical analysis refers to the analysis of one variable at a time (Bryman & Bell, 2015). In this chapter, the empirical data gathered through the self-completion questionnaire will be analysed for each individual variable in accordance with the RAA framework (refer to Table 16). A summary of all the individual variables and coding is included in Appendix I. A data exploration of the key variables with the relevant background factors is also included, giving indications of the subsequent hypothesis testing.

4.1.2 Background Factors

The respondents were asked basic questions about their socio-demographic background (see section 3.2.2.5), such as their age, sex, study programme, nationality, current living arrangements, principal source of financial support, and class rank. Based on insights from the literature review (see section 2.4.4.2), the education level of their parents, the prior personal finance education received, and an assessment of the financial knowledge of their respective parents or legal guardians were also elicited. Furthermore, the questionnaire section on background factors (see Appendix C) contained an assessment of character-based variables frequently identified as being salient in FL and SMP research (see section 2.4.4).

4.1.2.1 Socio-demographic Factors

An overview of all socio-demographic factors is provided in Table 61 – Socio-Demographic Background Variables*.* For salient socio-demographic factors (sex, study subject, and class rank), a comparison with the overall eligible student population at Reutlingen University (based on statistics obtained from Reutlingen University Administration) is exhibited in Table 54 to assess the representativeness of the responses obtained for the overall population. This assessment shows that the sample appears to be a balanced representation of the underlying population based on the parameters provided by the university administration.[15]

[15] Due to the data protection rules at Reutlingen University, additional or more detailed population statistics could not be made available.

Table 61 – Socio-Demographic Background Variables – Frequencies

		Frequency	Percent
Age	18 - 19	35	11.1
	20 - 21	103	32.7
	22 - 23	106	33.7
	24 - 25	40	12.7
	26 - 27	19	6.0
	28 - 29	8	2.5
	30 - 31	1	0.3
	32 or older	3	1.0
	Total	315	100.0
Sex	Male	171	54.3
	Female	144	45.7
	Total	315	100.0
Nationality	International	49	15.6
	Germany	266	84.4
	Total	315	100.0
Class Rank	1. Semester	31	9.8
	2. Semester	54	17.1
	3. Semester	22	7.0
	4. Semester	54	17.1
	5. Semester	21	6.7
	6. Semester	53	16.8
	7. Semester	34	10.8
	8. Semester	46	14.6
	Total	315	100.0
Study Subject	Non-Business Student	190	60.3
	Business Student	125	39.7
	Total	315	100.0
Personal Finance Education received prior to university studies	No	225	71.4
	Yes	90	28.6
	Total	315	100.0
Education Legal Guardian	Not Applicable	7	2.2
	Non-Academic	165	52.4
	Academic	143	45.4
	Total	315	100.0
Practical Experience SMP	No	221	70.2
	Yes	94	29.8
	Total	315	100.0
Living arrangements	I live alone (only adult in household)	67	21.3
	I live with my spouse/partner/significant other	30	9.5
	I live in my parents' home	102	32.4
	I live with other family, friends, or roommates.	112	35.6
	Prefer not to say	4	1.3
	Total	315	100.0
Principal Source of Financial Support	Own salary / wage (employment)	110	34.9
	Income from own business	8	2.5
	Supported by parents and/or other relatives	147	46.7
	Scholarship	14	4.4
	Other principal source of financial support	5	1.6
	Prefer not to say	13	4.1
	German Federal Student Loan ("BAföG")	18	5.7
	Total	315	100.0

4.1.2.2 Character-Based Factors

4.1.2.2.1 Descriptive Statistics

The rationale and scoring procedures of the character-based variables, comprising *disposition to trust* (Q.5.2), *sociability* (Q.5.3), *level of optimism* (Q.5.4), and *money preferences* (Q.5.5), are outlined in section 3.2.2.5.1. The scoring for each factor was derived as the simple unweighted average of the respective component statement scores. This approach is consistent with Dobni and Racine (2015).

Table 62 – Univariate Statistics – Character-Based Factors

	N	Mean	Median	Mode	Std. Deviation	Skewness	Kurtosis
Score Q.5.2 Disposition to Trust	315	4.0974	4.0000	4.00	1.23483	0.049	-0.284
Score Q5.3 Sociability	315	3.9467	4.0000	3.80	0.91524	-0.155	-0.252
Score Q5.4 Level of Optimism	315	4.8365	4.8333	4.83	0.84649	-0.225	1.033
Score Q5.5 Money Preferences	315	3.5164	3.3333	3.00	1.31193	0.196	-0.921

Rating Scale: *Q.5.2, Q.5.4 and Q.5.5 comprises opinion statements scored on a 7-point unipolar scale "Strongly Agree (7) - Strongly Disagree (1)" with 4 indicating neither agreement nor disagreement*

Q.5.2 is scored on a 7-point unipolar scale indicating frequency of social interactions from "Almost every day (7) - Never (1)"

Table 63 – Descriptive Statistics – Disposition to Trust (Q.5.2)

Statement	N	Strongly disagree (1)	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree (7)	Mean	Std. Deviation	Attitude
		%	%	%	%	%	%	%			
Q 5.2.1 Agreement to statement "In general, people can't be trusted."	315	4.8	17.8	20.0	17.5	25.4	10.8	3.8	3.89	1.537	Neither Agree nor Disagree
Q 5.2.2 Agreement to statement "When dealing with strangers, it is better to be cautious before trusting them."	315	1.3	4.4	9.5	12.1	30.2	28.3	14.3	5.07	1.400	Agree
Q 5.2.3 Agreement to statement "Nowadays you can't rely on anybody."	315	11.1	24.4	23.2	15.6	16.2	6.0	3.5	3.33	1.578	Disagree

Table 64 – Descriptive Statistics – Sociability (Q.5.3)

Statement	N	Never (1)	Once a year or less	Several times a year	Once a month	Several times a month	Several times a week	Almost every day (7)	Mean	Std. Deviation
		%	%	%	%	%	%	%		
Q 5.3.1 Frequency of engaging in "Giving or attending a party"	315	4.1	10.8	22.5	23.5	33.7	5.4	0	3.88	1.254
Q 5.3.2 Frequency of engaging in "Entertaining people in your home"	315	5.7	7.3	21.6	20.0	34.9	8.9	1.6	4.04	1.369
Q 5.3.3 Frequency of engaging in "Visiting with friends"	315	0.3	0.3	7.0	11.7	46.0	29.2	5.4	5.12	0.986
Q 5.3.4 Frequency of engaging in "Doing volunteer work"	315	30.8	19.4	14.3	9.5	15.2	9.2	1.6	2.93	1.794
Q 5.3.5 Frequency of engaging in "Talking with or visiting your neighbors"	315	14.0	11.4	18.7	15.9	25.1	10.2	4.8	3.76	1.715

Table 65 – Descriptive Statistics – Level of Optimism (Q.5.4)

Statement	N	Strongly disagree (1)	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree (7)	Mean	Std. Deviation	Attitude
		%	%	%	%	%	%	%			
Q 5.4.1 Agreement to statement "I rarely count on good things happening to me." *)	315	9.5	21.9	23.8	19.4	14.6	7.3	3.5	3.43	1.553	Disagree / indicating positive attitude *)
Q 5.4.2 Agreement to statement "I'm always optimistic about my future."	315	1.0	3.5	6.3	13.7	26.7	34.3	14.6	5.23	1.318	Agree
Q 5.4.3 Agreement to statement "In uncertain times, I usually expect the best."	315	2.5	9.2	21.9	19.7	30.2	11.7	4.8	4.20	1.408	Agree
Q 5.4.4 Agreement to statement "If something can go wrong for me, it will." *)	315	7.6	23.2	27.3	20.0	10.2	7.6	4.1	3.41	1.525	Disagree / indicating positive attitude *)
Q 5.4.5 Agreement to statement "Overall, I count on more good things to happen to me than bad things."	315	0.3	1.0	8.3	13.0	25.7	35.2	16.5	5.35	1.223	Agree
Q 5.4.6 Agreement to statement "I hardly ever count on things to go my way." *)	315	3.5	19.7	27.0	19.0	15.9	12.1	2.9	3.72	1.482	Disagree / indicating positive attitude *)
*) Scoring for Questions Q.5.4.1, Q.5.4.4 and Q.5.4.6 was recoded to account for opposite direction of underlying question.											

Table 66 – Descriptive Statistics – Money Preferences (Q.5.5)

Statement	N	Strongly disagree (1)	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree (7)	Mean	Std. Deviation	Attitude
		%	%	%	%	%	%	%			
Q 5.5.1 Agreement to statement "I find it more satisfying to spend money than to save it for the long term"	315	11.4	21.6	22.2	9.2	19.7	13.3	2.2	3.52	1.695	Disagree
Q 5.5.2 Agreement to statement "I tend to live for today and let tomorrow take care of itself"	315	14.6	27.3	22.2	9.8	15.6	8.9	1.3	3.15	1.611	Disagree
Q 5.5.3 Agreement to statement "Money is there to be spent"	315	9.5	11.1	16.5	21.6	28.9	11.1	1.3	3.88	1.519	Neither agree nor disagree

Whereas *disposition to trust* (Q.5.2) and *sociability* (Q.5.3) exhibit near normal distributions with mean and mode centring on the mid-point value of 4.0, *level of optimism* (Q.5.4) shows a clear skew towards a more optimistic outlook (mean of 4.84). *Money preferences* (Q.5.5) also show a skew (mean of 3.33), indicating a more long-term-focused approach to money management. Nevertheless, the distribution of Q.5.5 exhibits comparatively low kurtosis, indicating a wide spread of responses.

4.1.2.2.2 Sub-Sample Exploratory Data Analysis

The character-based composite scores (see Table 62) and Pearson's correlation were utilised to establish potential statistically significant associations with salient socio-demographic factors. The results are reported in Table 67 and show that statistically significant correlations at the $p < 0.01$ level exist for "nationality", "study subject", and "education of legal guardian". International students (mean 4.62, N = 49) exhibit a higher *disposition to trust score* (Q.5.2) than German students (mean 4.00, N = 266). Business students are more optimistic (mean = 5.01, N = 125) than non-business students (mean = 4.72, N = 190). It is noticeable that students with at least one legal guardian/parent who has achieved an academic level of education are less trusting (mean = 3.87, N = 143) than students of non-academic parents (mean = 4.31, N = 165), yet they exhibit a higher level of sociability (academic: mean = 4.11 in comparison with non-academic: mean = 3.84).

Table 67 – Character-Based Scores – Correlations with Socio-Demographic Factors

Pearson Correlations	Score - Disposition to Trust	Score - Sociability	Score - Level of Optimism	Score - Money Preferences
Nationality	-.182**	0.052	0.100	-0.105
Sex	-0.005	0.059	-0.065	-0.062
Study Subject (Business vs. Non-Business)	-0.022	0.100	.167**	-0.018
Personal Finance Education received prior to university studies	-0.042	.115*	.133*	0.062
Education Legal Guardian All	-.148**	.198**	.131*	-0.037
Practical Experience SMP	-.127*	0.065	.118*	-0.073

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

4.1.2.3 Risk Aversion

The univariate analysis of the factor *risk aversion* is based on the variable grouping outlined in Table 31 (section 3.2.2.5.1). Therefore, the answer to the risk aversion question 1 (Q.6.1)[16] defines whether a respondent is categorised into Groups 1 or 2 (comparatively less risk averse by answering "yes") or Groups 3, 4, or 5 (comparatively more risk averse by answering "no" or "do not know"). Table 69 shows that 43.8% (N = 138) of the respondents are less risk averse (answering "yes") while 56.2% (N = 177) replied "no" or "do not know" and are thus considered to be more risk averse.

[16] Q.6.1: Would you take the new job? There is a 50% chance that it will double your income and a 50% chance that it will cut your (family) income by a third.

Table 68 – Frequency Distribution – Risk Aversion Grouping

		Frequency	Percent
Risk Aversion_Grouping	Group 5 - Do not know	34	10.8
	Group 4 - Most Risk Averse	75	23.8
	Group 3 - Risk Averse	68	21.6
	Group 2 - Medium Risk Averse	89	28.3
	Group 1 - Least Risk Averse	49	15.6
	Total	315	100.0

Table 69 – Frequency Distribution – Risk Aversion Question 1 (Q.6.1)

		Frequency	Percent
Q 6.1 RIsk Aversion Question 1	No	108	34.3
	Yes	138	43.8
	Do not know	69	21.9
	Total	315	100.0

When looking at the reply to Q.6.1 by sub-samples based on background factor differentiation (see Table 70), differences emerge for the factors “study subject” (54.4% of business students versus 36.8% of non-business students answered “yes”), “personal finance education” (54.4% of respondents who received personal finance education prior to their university studies (Q.2.8) answered Q.6.1 with “yes”, whereas only 39.6% of those who did not receive personal finance education prior to their university studies answered Q.6.1 with “yes”; however, the difference is statistically not significant at $p > 0.05$). Differences also emerged for the factors “TOK adequacy” (50.0% of TOK adequate versus 37.3% of TOK inadequate answered “yes” to Q.6.1) and “practical SMP experience” (59.6% of SMP experienced versus 37.1% of SMP inexperienced answered “yes” to Q.6.1).

The Pearson chi-square test was performed to determine whether any associations between the risk aversion variable and the background factors met the threshold of statistical significance. The response to Q.6.1 was utilised as a proxy for the dependent risk aversion variable. Statistical significance was measured against a confidence interval of 95% by employing a chi-square test[17] (i.e. the null hypothesis was accepted if H_0: $p > 0.05$) for the null

[17] The statistical significance value in accordance with Fisher’s exact test was utilised.

hypothesis that any individual background variable is not related to the dependent variable. The results are summarised in Table 70. Based on the chi-square test, only the associations "study subject", "practical SMP experience", "sociability score", and "TOK adequacy" meet the threshold of statistical significance.

Table 70 – Risk Aversion Question 1 (Q.6.1) and Risk Aversion Grouping by Background Factor

Factor	Categories	Q 6.1 RIsk Aversion Question 1					Risk Aversion_Grouping				
		No	Yes	Do not know	Pearson Chi-Square test	Association statistically significant?	Group 5 - Do not know	Group 4 - Most Risk Averse	Group 3 - Risk Averse	Group 2 - Medium Risk Averse	Group 1 - Least Risk Averse
Nationality	International	30.6%	55.1%	14.3%			6.1%	20.4%	18.4%	30.6%	24.5%
	Germany	35.0%	41.7%	23.3%			11.7%	24.4%	22.2%	27.8%	13.9%
	Total	34.3%	43.8%	21.9%	0.180	No	10.8%	23.8%	21.6%	28.3%	15.6%
Sex	Male	33.9%	46.8%	19.3%			7.6%	21.1%	24.6%	32.2%	14.6%
	Female	34.7%	40.3%	25.0%			14.6%	27.1%	18.1%	23.6%	16.7%
	Total	34.3%	43.8%	21.9%	0.379	No	10.8%	23.8%	21.6%	28.3%	15.6%
Study Subject	Non-Business Student	40.0%	36.8%	23.2%			12.1%	26.8%	24.2%	23.7%	13.2%
	Business Student	25.6%	54.4%	20.0%			8.8%	19.2%	17.6%	35.2%	19.2%
	Total	34.3%	43.8%	21.9%	0.006	Yes	10.8%	23.8%	21.6%	28.3%	15.6%
Personal Finance Education received prior to university	No	37.3%	39.6%	23.1%			12.0%	26.2%	22.2%	25.8%	13.8%
	Yes	26.7%	54.4%	18.9%			7.8%	17.8%	20.0%	34.4%	20.0%
	Total	34.3%	43.8%	21.9%	0.052	No	10.8%	23.8%	21.6%	28.3%	15.6%
Background - Education Legal Guardian	Not Applicable	57.1%	28.6%	14.3%			14.3%	57.1%			28.6%
	Non-Academic	35.2%	40.0%	24.8%			10.9%	25.5%	23.6%	25.5%	14.5%
	Academic	32.2%	49.0%	18.9%			10.5%	20.3%	20.3%	32.9%	16.1%
	Total	34.3%	43.8%	21.9%	0.346	No	10.8%	23.8%	21.6%	28.3%	15.6%
Practical Experience SMP	No	37.6%	37.1%	25.3%			13.6%	25.3%	24.0%	24.4%	12.7%
	Yes	26.6%	59.6%	13.8%			4.3%	20.2%	16.0%	37.2%	22.3%
	Total	34.3%	43.8%	21.9%	0.001	Yes	10.8%	23.8%	21.6%	28.3%	15.6%
Background - Disposition of Trust Score	Mean or higher	34.1%	44.9%	21.0%			9.6%	25.1%	20.4%	28.7%	16.2%
	Below mean	34.5%	42.6%	23.0%			12.2%	22.3%	23.0%	27.7%	14.9%
	Total	34.3%	43.8%	21.9%	0.895	No	10.8%	23.8%	21.6%	28.3%	15.6%
Background - Sociability Score	Mean or higher	42.7%	38.0%	19.3%			10.7%	27.3%	24.0%	26.0%	12.0%
	Below mean	26.7%	49.1%	24.2%			10.9%	20.6%	19.4%	30.3%	18.8%
	Total	34.3%	43.8%	21.9%	0.011	Yes	10.8%	23.8%	21.6%	28.3%	15.6%
Background - Level of Optimism Score	Mean or higher	37.5%	38.6%	23.9%			10.8%	26.1%	24.4%	26.1%	12.5%
	Below mean	30.2%	50.4%	19.4%			10.8%	20.9%	18.0%	30.9%	19.4%
	Total	34.3%	43.8%	21.9%	0.115	No	10.8%	23.8%	21.6%	28.3%	15.6%
Background - Money preferences Score / Above or below Mean	Mean or higher	37.3%	40.8%	21.9%			10.7%	27.8%	20.7%	29.0%	11.8%
	Below mean	30.8%	47.3%	21.9%			11.0%	19.2%	22.6%	27.4%	19.9%
	Total	34.3%	43.8%	21.9%	0.438	No	10.8%	23.8%	21.6%	28.3%	15.6%
Total Objective Financial Knowledge - ADEQUACY	OK inadequate	35.9%	37.3%	26.8%			13.7%	26.1%	22.9%	22.9%	14.4%
	OK adequate	32.7%	50.0%	17.3%			8.0%	21.6%	20.4%	33.3%	16.7%
	Total	34.3%	43.8%	21.9%	0.040	Yes	10.8%	23.8%	21.6%	28.3%	15.6%

To differentiate the analysis further, dummy variables were created for the risk aversion grouping and analysed for statistically significant correlations with the background variables and OK. The results are summarised in Table 71 and overall confirm the analysis in Table 70.

It is noticeable that the respondents in Group 1 (least risk averse) appear to be more sociable and exhibit a higher degree of optimism.

Table 71 – Risk Aversion Dummy Variables by Background Factor and OK Correlations

Pearson Correlations	B_RiskAversion=Group 5 - Do not know	B_RiskAversion=Group 4 - Most Risk Averse	B_RiskAversion=Group 3 - Risk Averse	B_RiskAversion=Group 2 - Medium Risk Averse	B_RiskAversion=Group 1 - Least Risk Averse
Nationality	0.065	0.034	0.034	-0.022	-0.106
Sex	.112*	0.071	-0.079	-0.095	0.028
Study Subject (Business vs. Non-Business)	-0.052	-0.088	-0.079	.125*	0.082
Personal Finance Education received prior to university studies	-0.061	-0.090	-0.024	0.087	0.078
Education Legal Guardian All	-0.013	-0.102	-0.005	.112*	-0.003
Practical Experience SMP	-.137*	-0.055	-0.089	.130*	.122*
Score - Disposition to Trust	0.008	-0.022	0.013	-0.010	0.016
Score - Sociability	-0.029	-0.103	-0.074	0.046	.173**
Score - Level of Optimism	0.017	-0.083	-0.099	0.037	.150**
Score - Money Preferences	0.006	-.116*	0.039	-0.020	.112*
Total Objective Financial Knowledge - SCORE	-0.110	-0.022	-0.025	.129*	-0.011
Basic Objective Financial Knowledge - SCORE - Big Three	-0.013	-0.092	-0.011	0.072	0.043
Advanced Objective Financial Knowledge - SCORE	-.125*	-0.034	-0.018	.127*	0.009
**. Correlation is significant at the 0.01 level (2-tailed).					
*. Correlation is significant at the 0.05 level (2-tailed).					

4.1.3 Attitude and Behavioural Beliefs

As outlined in 3.2.2.2.4, the RAA framework suggests a direct and an indirect method of measuring attitude towards behaviour (refer to Table 25). The indirect measure utilises the expectancy–value model (refer to Equation 3) comprised of agreement or disagreement with belief statements scored on a seven-point bipolar scale (-3 to +3) and an outcome evaluation. The direct measure employs semantic differentials on a seven-point bipolar scale (-3 to +3). Attitude is measured along the key subjects outlined in Table 27. In the first step, the composite attitude scores are analysed before each component is assessed individually.

4.1.3.1 Overall Attitude Scores

4.1.3.1.1 Composite Scores

The definitions for the composite attitude scores are outlined in section 3.2.2.2.4.2. Table 72 summarises the descriptive statistics for the composite attitude score. The overall mean (mean = 3.5693 with std deviation = 10.79880) indicates a slightly positive attitude tendency towards the stock market and SMP based on bipolar scoring, with zero indicating a neutral stance.

Table 72 – Descriptive Statistics/Composite Attitude Scores

	N	Range	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Composite Direct Attitude Score	315	32.33	-13.67	18.67	2.3164	5.39203	0.055	0.137	0.145	0.274
Composite Indirect Attitude Score	315	53.78	-25.78	28.00	1.2529	6.59196	0.509	0.137	2.701	0.274
Composite Attitude Score	**315**	**77.44**	**-34.78**	**42.67**	**3.5693**	**10.79880**	**0.350**	**0.137**	**1.465**	**0.274**

4.1.3.2 Morality

The attitude factor of *morality* refers to the extent to which the stock market is perceived to be unethical, corrupt, and gambling-like (Dobni & Racine, 2015). The measurement items for both indirect and direct measures are summarised in Table 73 with reference to the survey instrument (see Appendix C).

Table 73 – Attitude Measurement/Morality

Section*)	Sub-Section*)	Role	Description	Number of Items	Scale	Measurement
			Indirect Measures			
Q.9	2	Belief Statements	Eight belief statements on 7-point "Strongly agree - Strongly Disagree" scale to measure construct "Stock Market - Immorality"	8	+3 to - 3 (7-point) bipolar "Strongly Agree - Disagree"	unweighted average of relevant items
Q.10	1.1	Outcome Evaluation	Consideration of Morality of the Stock Market	1	+3 to - 3 (7-point) bipolar "Extremely Desirable - Undesirable"	singular item
			Direct Measures			
Q.11		Attitude - Direct Measurement (Semantic Differential)	Two direct measures: Q.11.1.3 - Consideration of stock market as "moral vs. Immoral" Q.11.2.3 - Consideration of stock market investing as "ethical vs. Unethical"	2	7-point Semantic Differential	unweighted average of relevant items

) Section and Sub-Section Figures correspond to the Survey Question Numbering as outlined in **Appendix C.*

4.1.3.2.1 Indirect Measurement (EVM)

The indirect measurement of morality follows the expectancy value model (refer to Equation 3). The survey instrument considered eight belief statements on a seven-point bipolar scale (see Q9.2 in Appendix C), and the descriptive statistics are summarised in Table 74.

Table 74 – Descriptive Statistics/Morality (Indirect Measurement)

Variable	N		Mean	Median	Mode	Std. Deviation	Attitude
	Valid	Missing*)					
Q 9.2.1 SMI / Belief Strength / Morality "The stock market is corrupt"	311	4	0.4244	0.0000	0.00	1.33196	Disagree
Q 9.2.2 SMI / Belief Strength / Morality "The stock market is rigged"	307	8	0.1303	0.0000	-1.00	1.34163	Disagree
Q 9.2.3 SMI / Belief Strength / Morality "The stock market is under-regulated"	277	38	0.2058	0.0000	0.00	1.36104	Disagree
Q 9.2.4 SMI / Belief Strength / Morality "The stock market is harmful to society as a whole."	312	3	0.8526	1.0000	2.00	1.52072	Disagree
Q 9.2.5 SMI / Belief Strength / Morality "Investing in the stock market is for suckers."	310	5	2.0452	2.0000	3.00	1.13115	Disagree
Q 9.2.6 SMI / Belief Strength / Morality "In their ongoing publicity efforts, publicly traded corporations commonly mislead investors."	287	28	0.5052	0.0000	0.00	1.33503	Disagree
Q 9.2.7 SMI / Belief Strength / Morality "Use of insider information is common in the stock market"	304	11	-0.7072	-1.0000	-1.00	1.34108	Agree
Q 9.2.8 SMI / Belief Strength / Morality Losses and gains in the stock market are just a matter of chance	314	1	0.8535	1.0000	2.00	1.42688	Disagree
Score Q9.2 Morality BIPOLAR (Recoded Values: Agree - / Disagree +)	315	0	0.5266	0.5000	0.75	0.84699	Disagree

**) Missing entries denote the response "Do not understand the statement"*

Variable	N		Mean	Median	Mode	Std. Deviation	Attitude
	Valid	Missing					
Q 10.1.1 SMI / Outcome Evaluation "Morality of the Stock Market"	315	0	0.8317	1.0000	0.00	1.19724	Desirable
Score EVM "Morality" (SCO_Q.9.2_BIPOLAR * Q10.1_1_BIPOLAR)	315	0	0.3659	0.0000	0.00	1.39746	Desirable

Figure 3 – Frequency Distribution – Belief Statements/Morality

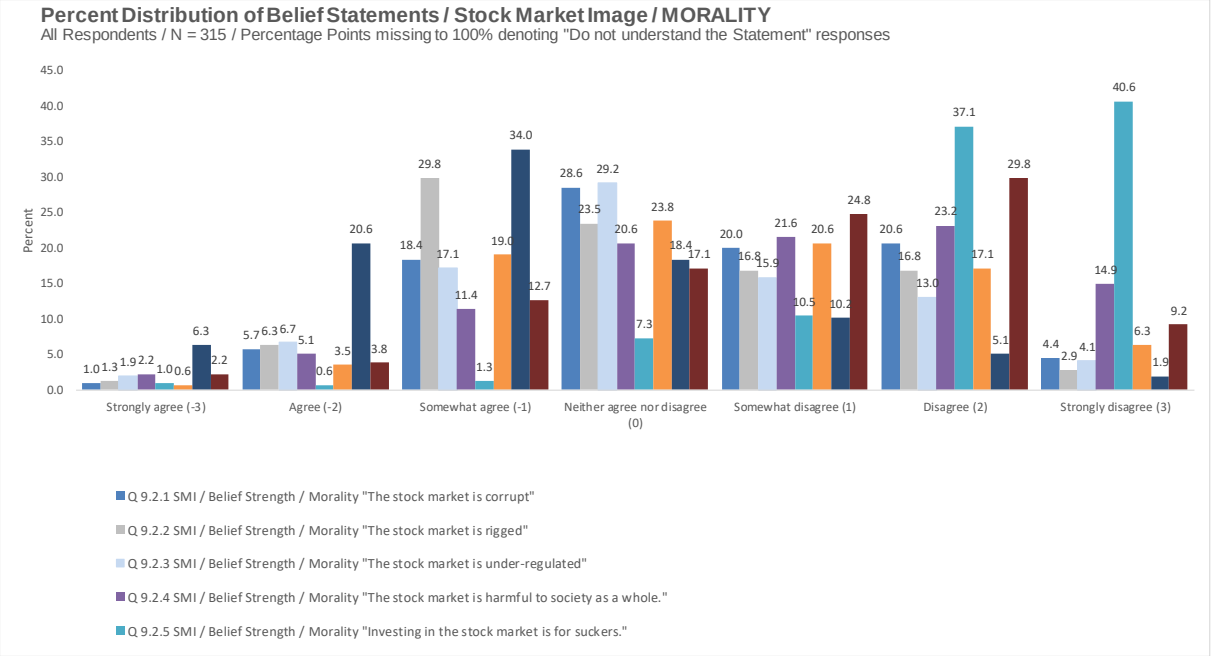
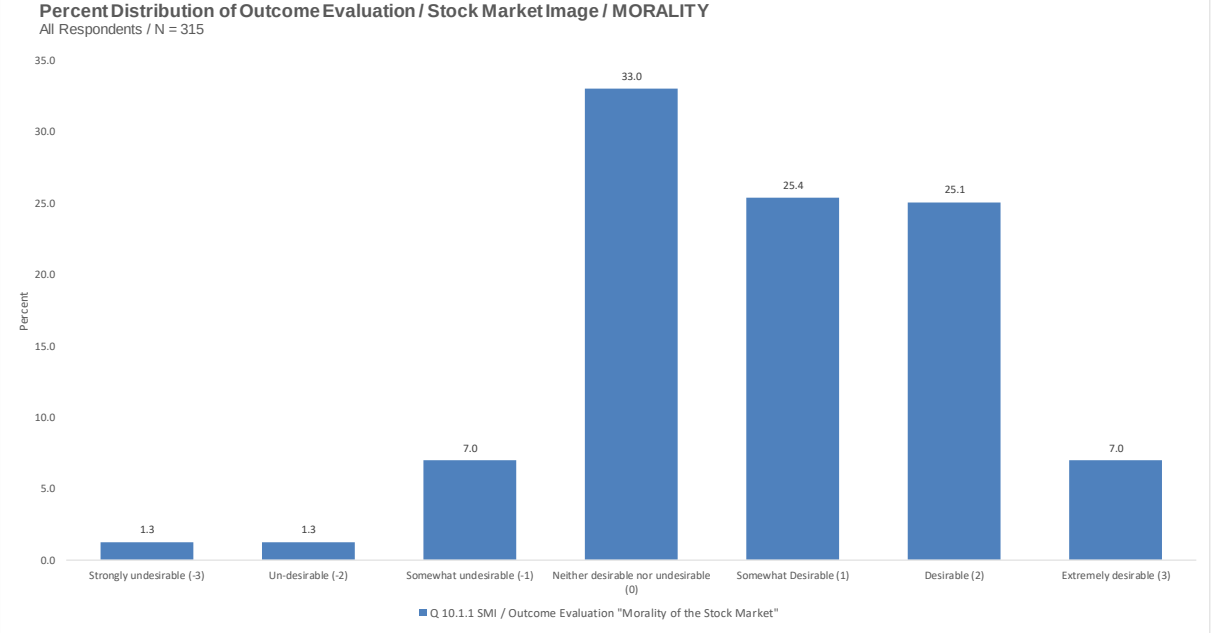


Figure 4 – Frequency Distribution – Outcome Evaluation/Morality



The univariate statistics on the belief statements show that the overall mean, median, and mode centre between the respective values of 0 and +1,[18] thus denoting slightly positive beliefs in connection with the morality of the stock market. Consequently, on a composite score basis (see Table 74), the belief statement mean is 0.53 with a standard deviation of 0.847. Noticeable deviations are, on the one hand, item Q.9.2.5 "Investing in the stock markets

[18] The answers to the Q.9.2 belief statements were recoded so that positive values indicate disagreement and negative values agreement with the opinion statements.

is for suckers" with a mean of 2.04 and a mode of 3, indicating that the respondents strongly rejected the notion that only "suckers" invest in the stock market. On the other hand, the only overall negative response to a belief statement refers to Q.9.2.7 "Use of insider information in the stock market is common" (mean of -0.702 and mode of -1), indicating that the respondents believe that stock markets are not entirely transparent. The outcome evaluation (see Table 74 and refer to Q.10.1 in Appendix C), which evaluates the desirability of investing in the stock market while considering the specific aspect, similarly results in an overall positive stance of the respondents, with a mean of 0.53 (standard deviation of 0.847). However, for a large proportion of the respondents (N = 104; see Figure 4), the aspect of morality is "neither desirable nor undesirable" and consequently would not be expected to exert an impact on their behavioural intention in the RAA framework context.

Consequently, the EVM score for morality indicates an overall slightly positive attitude considering the morality of the stock market, with a mean of 0.37 (standard deviation of 1.397) based on a +9/-9 scale. However, both median and mode are 0.00, indicating that overall the consideration of "morality" might not be a salient factor in the assessment of SMI.

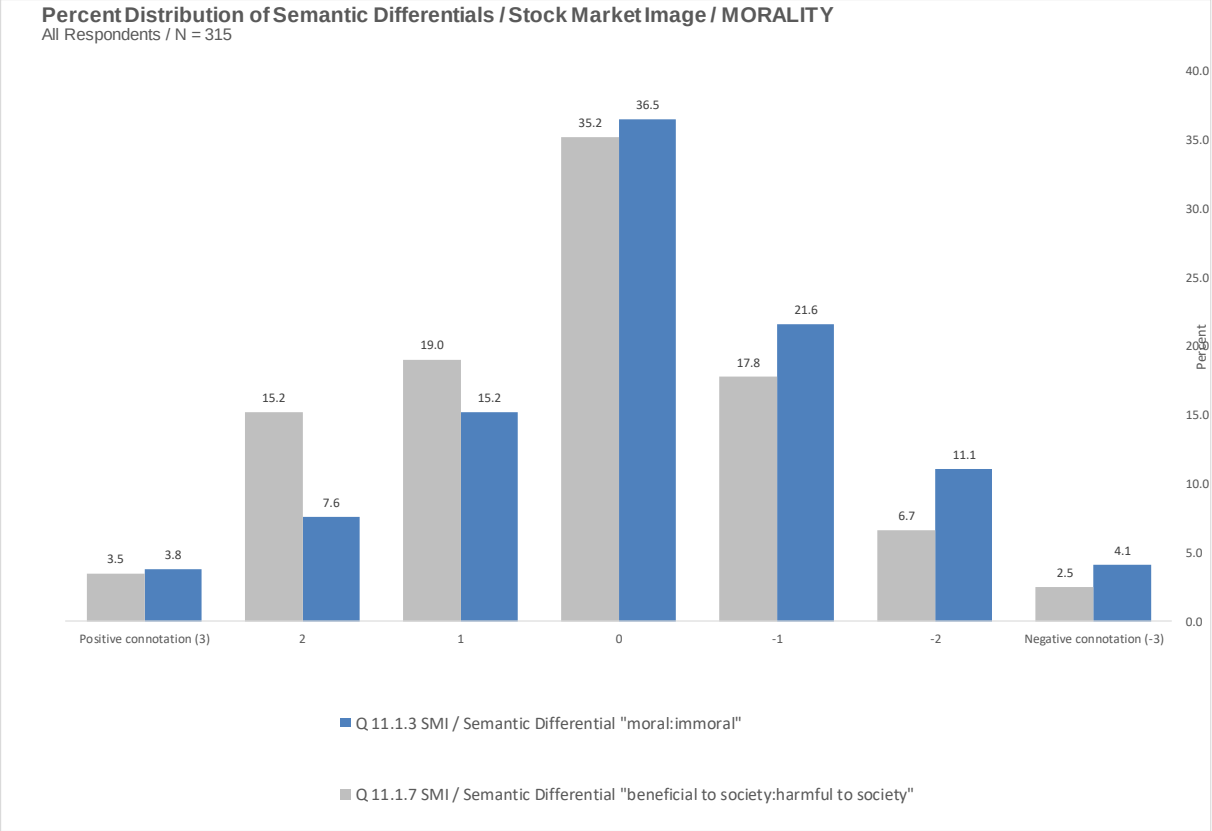
4.1.3.2.2 Direct Measurement (Semantic Differential)

The direct measurement was based on the assessment of two semantic differentials (see Q.11.1.3 and Q.11.2.3 in Appendix C) as well as the corresponding compound score ("Score Q.11 Morality") calculated on an unweighted average of these two items.

Figure 5 – Descriptive Statistics – Attitude/Morality (Direct Measurement)

	N		Mean	Median	Mode	Std. Deviation	Attitude
	Valid	Missing					
Q 11.1.3 SMI / Semantic Differential "moral:immoral"	315	0	-0.1429	0.0000	0.00	1.34800	Negative
Q 11.2.3 SMI / Semantic Differential "Consider Stock Market: ethical - unethical" (BIPOLAR)	315	0	-0.0508	0.0000	0.00	1.25580	Negative
Score Q.11 MORALITY / "Semantic Differential" 2 Items (sum(Q11.1_3_BIPOLAR,Q11.2_3_BIPOLAR) / 2)	315	0	-0.0968	0.0000	0.00	1.18885	Negative

Figure 6 – Frequency Distribution – Semantic Differential/Morality



Similar to the EVM score (see section 4.1.3.2.1), the direct measurement scored a median and mode of 0.00, indicating that overall the consideration of “morality” might not be a salient factor in the assessment of SMI. The mean values (see Figure 5), however, are slightly negative, which contrasts the corresponding positive value of the EVM score. Furthermore, the EVM score (Score EVM “Morality”) and the compound semantic differential score (Score Q.11 MORALITY/“Semantic Differential”) exhibit a statistically significant correlation (Pearson’s r = 0.424, significant at the $p < 0.01$ level).

4.1.3.3 Facilitators

The dimension “facilitators” considers the attitude of respondents towards professional financial advisors. The indirect and direct measures applied in accordance with the RAA for this dimension are outlined in Table 75.

Table 75 – Attitude Measurement/Facilitators

Section*)	Sub-Section*)	Role	Description	Number of Items	Scale	Measurement
			Indirect Measures			
Q.9	3.1 - 3.3	Belief Statements	Three belief statements on 7-point "Strongly agree - Strongly Disagree" scale to measure construct "Facilitators / Professional Financial Advisors"	3	+3 to - 3 (7-point) bipolar "Strongly Agree - Disagree"	unweighted average of relevant items
Q.10	1.3	Outcome Evaluation	Consideration of Professional Financial Advice	1	+3 to - 3 (7-point) bipolar "Extremely Desirable - Undesirable"	singular item
			Direct Measures			
Q.11	4	Attitude - Direct Measurement (Semantic Differential)	Three direct measures Q.11.4.1 - Consideration of professional financial advice as "honest vs. dishonest" Q.11.4.2 - Consideration of professional financial advice as "competent vs. incompetent" Q.11.4.3 - Consideration of professional financial advice as "selfless vs. self-serving"	3	7-point Semantic Differential	unweighted average of relevant items

) Section and Sub-Section Figures correspond to the Survey Question Numbering as outlined in* ***Appendix C.*

4.1.3.3.1 Indirect Measurement (EVM)

The belief statements concerning facilitators (professional financial advisors) yield the finding that the respondents hold a slightly negative opinion of financial services professionals when it comes to trustworthiness and honesty (Q.9.3.1: mean = -0.24, mode = -1.00) as well as being a fiduciary (Q.9.3.2: mean = -0.30, mode = -1.00). In contrast, the respondents are overall undecided whether professional financial advisors provide good information when it comes to stock market investments (Q.9.3.3: mean = 0.20, mode = 0.00). The overall score (Score Q.9.3A: mean = -0.11, mode = 0.00) indicates that there are no pronounced positive or negative general beliefs regarding facilitators in the overall sample.

In contrast, the outcome evaluation (see section 4.1.3.3.2) that queried in a more personal way the impact of the available professional financial advice on personal considerations of SMI and the responses indicate significant appreciation (Q.10.1.3: mean = 1.38, median and mode = 2.00). This result might be explained by the fact that the respondents have an overall critical opinion of facilitators in general but a much more positive attitude towards facilitators whom they have interacted with personally. As a result, the relevant EVM score ("Score EVM Facilitators"; see Table 76) is overall fairly neutral, with a mean of 0.08 and both a median and a mode of 0.00. Nevertheless, the standard deviation of 2.18 suggests a wide spread of attitudes.

Table 76 – Descriptive Statistics – Attitude/Facilitators (Indirect Measurement)

Variable	N		Mean	Median	Mode	Std. Deviation	Attitude
	Valid	Missing*)					
Q 9.3.1 SMI / Belief Strength / Facilitators "In general, financial services professionals (for example, bank advisors, financial planners, stock brokers) are trustworthy and honest to their clients"	312	3	-0.2436	0.0000	-1.00	1.32923	Agree
Q 9.3.2 SMI / Belief Strength / Facilitators "In general, financial services professionals (for example, bank advisors, financial planners, stock brokers) have the best interests of clients in mind."	313	2	-0.3003	0.0000	-1.00	1.26056	Agree
Q 9.3.3 SMI / Belief Strength / Facilitators "In general, financial services professionals (for example, bank adviso..."	311	4	0.2026	0.0000	0.00	1.18626	Disagree
Score Q9.3A Facilitators BIPOLAR	312	3	-0.1140	0.0000	0.00	1.06992	Agree

**) Missing entries denote the response "Do not understand the statement"*

Variable	N		Mean	Median	Mode	Std. Deviation	Attitude
	Valid	Missing					
Q 10.1.3 SMI / Outcome Evaluation "Professional Financial Advice available to me"	315	0	1.3778	2.0000	2.00	1.35210	Desirable
Score EVM "Facilitators" (SCO_Q.9.3A_Facilitators_BIPOLAR * Q10.1_3_BIPOLAR)	314	1	0.0817	0.0000	0.00	2.17793	Desirable

Figure 7 – Frequency Distribution – Belief Statements/Facilitators

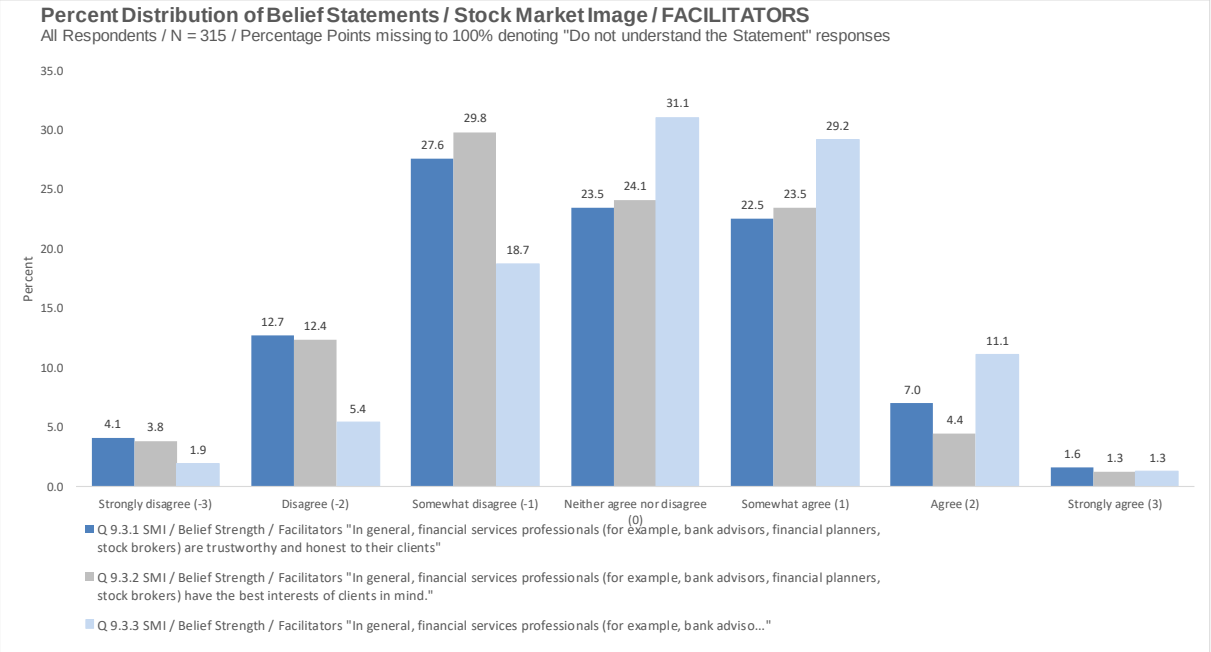
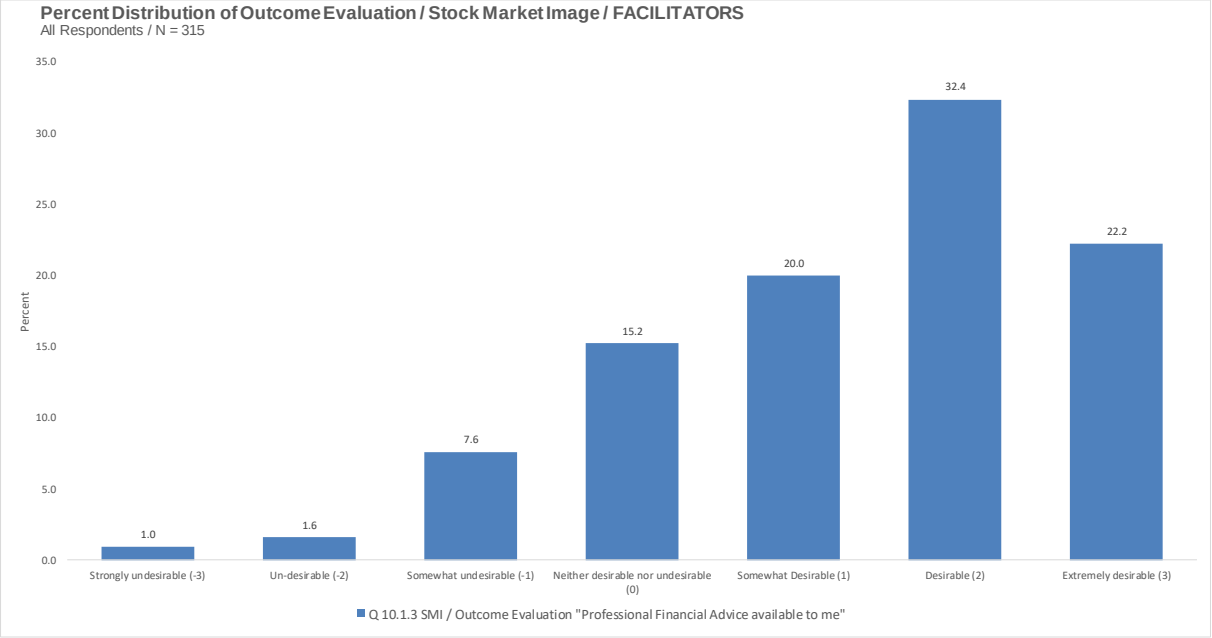


Figure 8 – Frequency Distribution – Outcome Evaluation/Facilitators



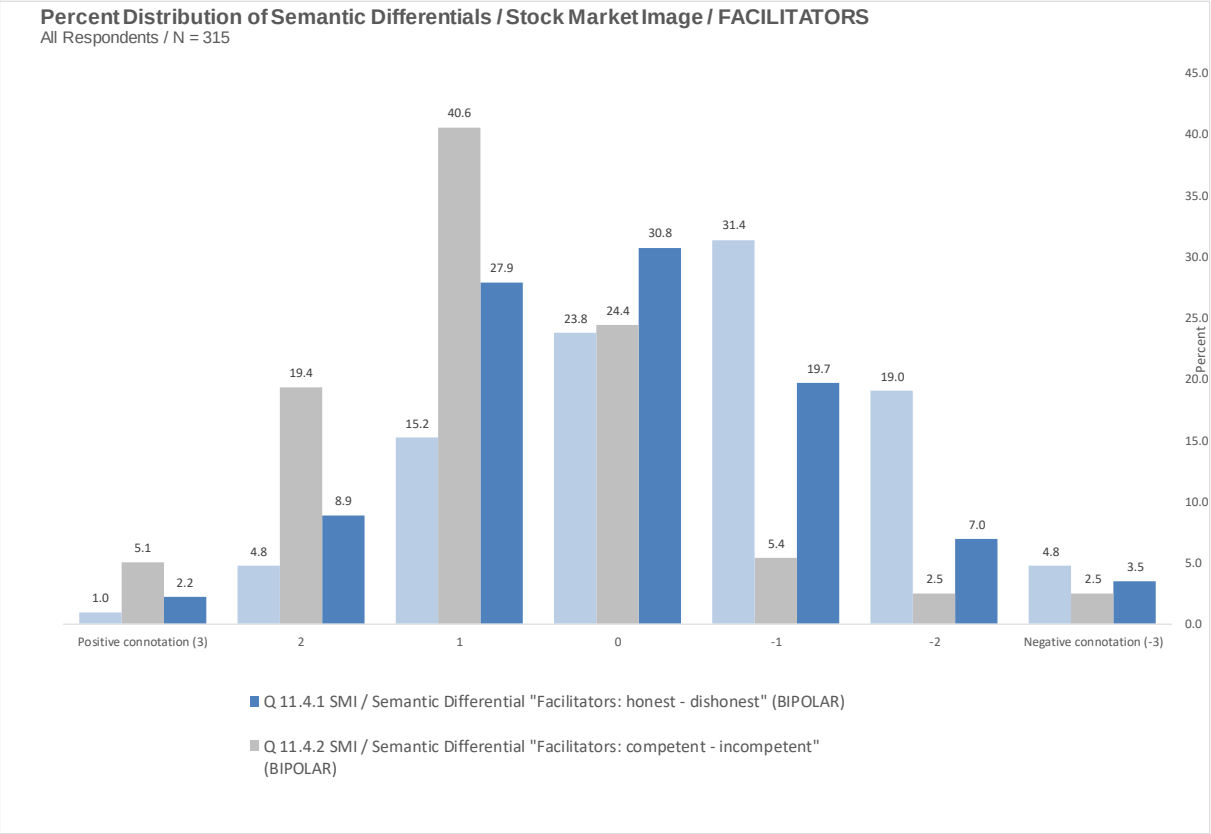
4.1.3.3.2 Direct Measurement (Semantic Differential)

The direct measurement queried the attitude towards facilitators along three semantic differential statements (see Table 77 and Figure 9). While the respondents assessed the competence (Q.11.4.2; mean = 0.77, median and mode = 1.00) as positive, they reported overall neutral opinions regarding the honesty of facilitators (Q.11.4.1: mean = 0.08, median and mode = 0.00) and negative opinions in terms of the fiduciary duty towards the facilitators' clients (Q.11.4.3: mean = -0.56, median and mode = -1.00). As a consequence, the unweighted compound score ("Score Q.11.4 Facilitators") also shows an overall neutral position towards facilitators (mean = 0.10 and median = 0.00). Furthermore, the EVM score ("Score EVM Facilitators") and the compound semantic differential score ("Score Q.11.4 Facilitators") exhibit a statistically significant correlation (Pearson's r = 0.409, significant at the 0.01 level).

Table 77 – Descriptive Statistics – Attitude/Facilitators (Direct Measurement)

Variable	N		Mean	Median	Mode	Std. Deviation	Attitude
	Valid	Missing					
Q 11.4.1 SMI / Semantic Differential "Facilitators: honest - dishonest" (BIPOLAR)	315	0	0.0825	0.0000	0.00	1.27426	Positive
Q 11.4.2 SMI / Semantic Differential "Facilitators: competent - incompetent" (BIPOLAR)	315	0	0.7651	1.0000	1.00	1.20060	Positive
Q 11.4.3 SMI / Semantic Differential "Facilitators: Selfless - Self-serving" (BIPOLAR)	315	0	-0.5619	-1.0000	-1.00	1.27387	Negative
Score Q.11.4 FACILITATORS / "Semantic Differential" (sum(Q11.4_1_BIPOLAR,Q11.4_2_BIPOLAR,Q11.4_3_BIPOLAR) / 3)	315	0	0.0952	0.0000	-0.33	1.05078	Positive

Figure 9 – Frequency Distribution – Semantic Differential/Facilitators



4.1.3.4 Regulators

The dimension “regulators” considers the attitude of the respondents towards financial market regulators. The indirect and direct measures applied in accordance with the RAA for this dimension are outlined in Table 78.

Table 78 – Attitude Measurement/Regulators

Section*)	Sub-Section*)	Role	Description	Number of Items	Scale	Measurement
			Indirect Measures			
Q.9	3.4 - 3.8	Belief Statements	Five belief statements on 7-point "Strongly agree - Strongly Disagree" scale to measure construct "Regulators"	5	+3 to - 3 (7-point) bipolar "Strongly Agree - Disagree"	unweighted average of relevant items
Q.10	1.2	Outcome Evaluation	Consideration of Stock Market Regulation	1	+3 to - 3 (7-point) bipolar "Extremely Desirable - Undesirable"	singular item
			Direct Measures			
Q.11	1	Attitude - Direct Measurement (Semantic Differential)	Two direct measures Q.11.1.4 - Consideration of stock market as "regulated vs. unregulated" Q.11.1.5 - Consideration of stock market as "fair vs. unfair"	2	7-point Semantic Differential	unweighted average of relevant items

) Section and Sub-Section Figures correspond to the Survey Question Numbering as outlined in **Appendix C.*

4.1.3.4.1 Indirect Measurement (EVM)

The belief statements concerning regulators indicate that the respondents overall hold a slightly negative to indifferent opinion of financial market regulation (see Table 79). In particular, the perception of stock market fairness (Q.9.3.7) yields an overall negative belief

(mean = -0.27, mode = -1.00). Nevertheless, the overall score (Score Q.9.3B: mean = -0.04, mode = 0.00) indicates that there are no pronounced positive or negative general beliefs regarding regulators in the sample overall. This might be explained partly by the fact that the number of respondents with actual stock market experience in the sample is limited and questions of stock market regulation are therefore of subordinate concern and interest to the respondents.

Table 79 – Univariate Statistics – Attitude/Regulators (Indirect Measurement)

Variable	N		Mean	Median	Mode	Std. Deviation	Attitude
	Valid	Missing*)					
Q 9.3.4 SMI / Belief Strength / Regulators "Stock market regulators do a good job of safeguarding investor interests."	296	19	0.0709	0.0000	0.00	1.18681	Agree
Q 9.3.5 SMI / Belief Strength / Regulators "The financial information that publicly traded companies disclose is straightforward and honest."	308	7	0.2013	0.0000	0.00	1.20195	Agree
Q 9.3.6 SMI / Belief Strength / Regulators "Regulation of insider trading is effective."	249	66	-0.1647	0.0000	0.00	1.06303	Disagree
Q 9.3.7 SMI / Belief Strength / Regulators "The stock market is fair for all investors."	308	7	-0.2662	0.0000	-1.00	1.40052	Disagree
Q 9.3.8 SMI / Belief Strength / Regulators "Stock market investors are adequately protected by antifraud and mandatory disclosure rules."	279	36	-0.1039	0.0000	0.00	1.19349	Disagree
Score Q9.3B Regulators BIPOLAR	313	2	-0.0441	0.0000	0.00	0.77871	Disagree

**) Missing entries denote the response "Do not understand the statement"*

Variable	N		Mean	Median	Mode	Std. Deviation	Attitude
	Valid	Missing					
Q 10.1.2 SMI / Outcome Evaluation "Stock Market Regulation" (BIPOLAR)	315	0	0.9492	1.0000	2.0000	1.1987	Desirable
Score EVM "Regulators" (SCO_Q.9.3B_Regulators_BIPOLAR * Q10.1_2_BIPOLAR)	314	1	-0.0274	0.0000	0.0000	1.2895	Negative

Figure 10 – Frequency Distribution – Belief Statements/Regulators

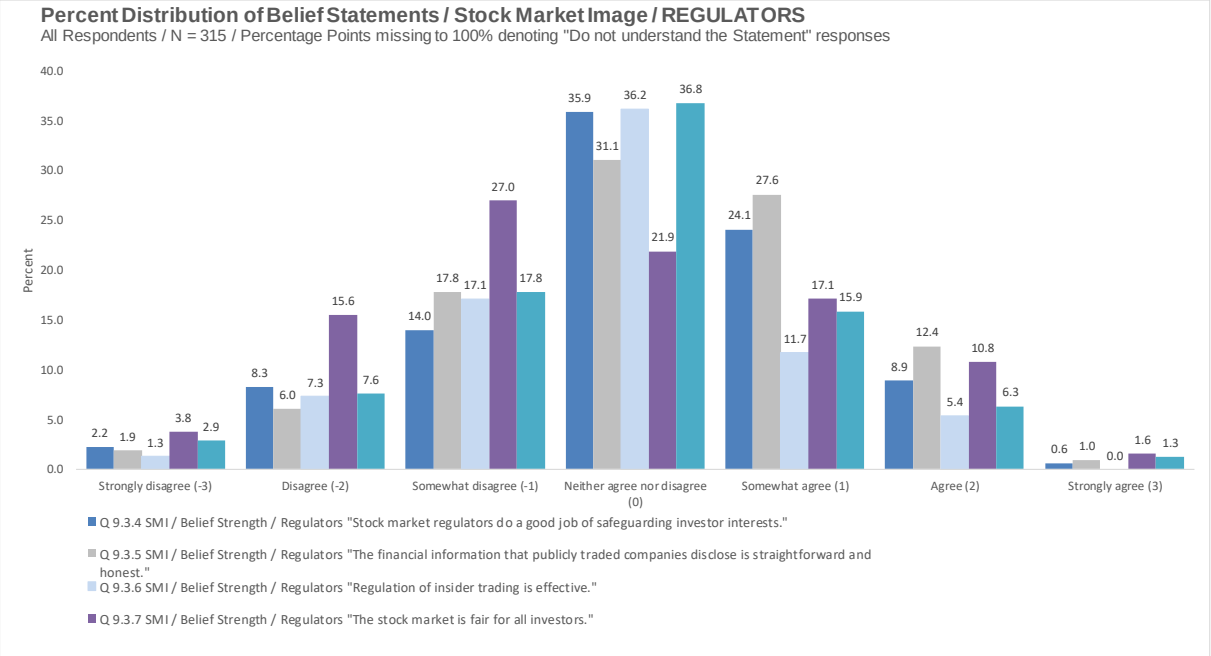
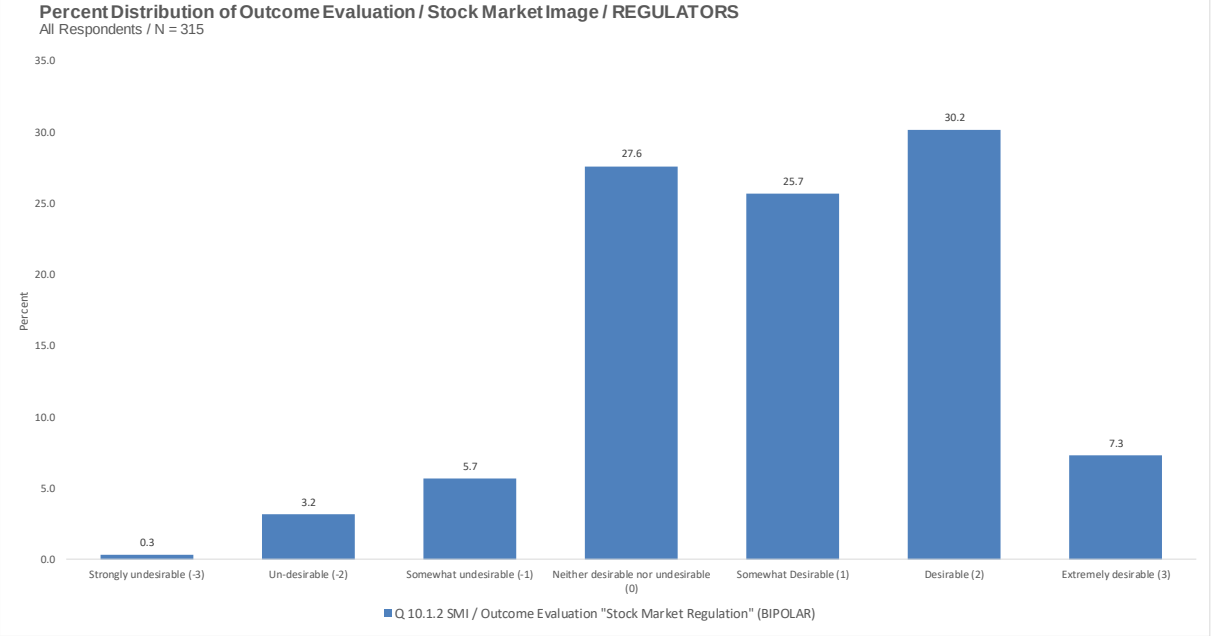


Figure 11 – Frequency Distribution – Outcome Evaluation/Regulators



In contrast, the outcome evaluation (see Figure 11) queried in a more personal way the impact of the stock market regulation on personal considerations of SMI, and the responses indicate significant appreciation (Q.10.1.2: mean = 0.95, median = 1-00, and mode = 2.00). This result might be explained by the fact that the respondents have an indifferent opinion of stock market regulation in general but a more positive attitude towards regulation as they have not been affected personally by perceived detrimental stock market effects. It should be recalled that, at the time of the last major stock market meltdown (the Global Financial Crisis of 2008), the

majority of the respondents were in their early teens or younger and thus might not have had first-hand experience of or paid attention to the negative effects on stock market participants from a severe crisis. As a result, the relevant EVM score ("Score EVM Regulators"; see Table 79) is overall fairly neutral, with a mean of 0.03 and both a median and a mode of 0.00.

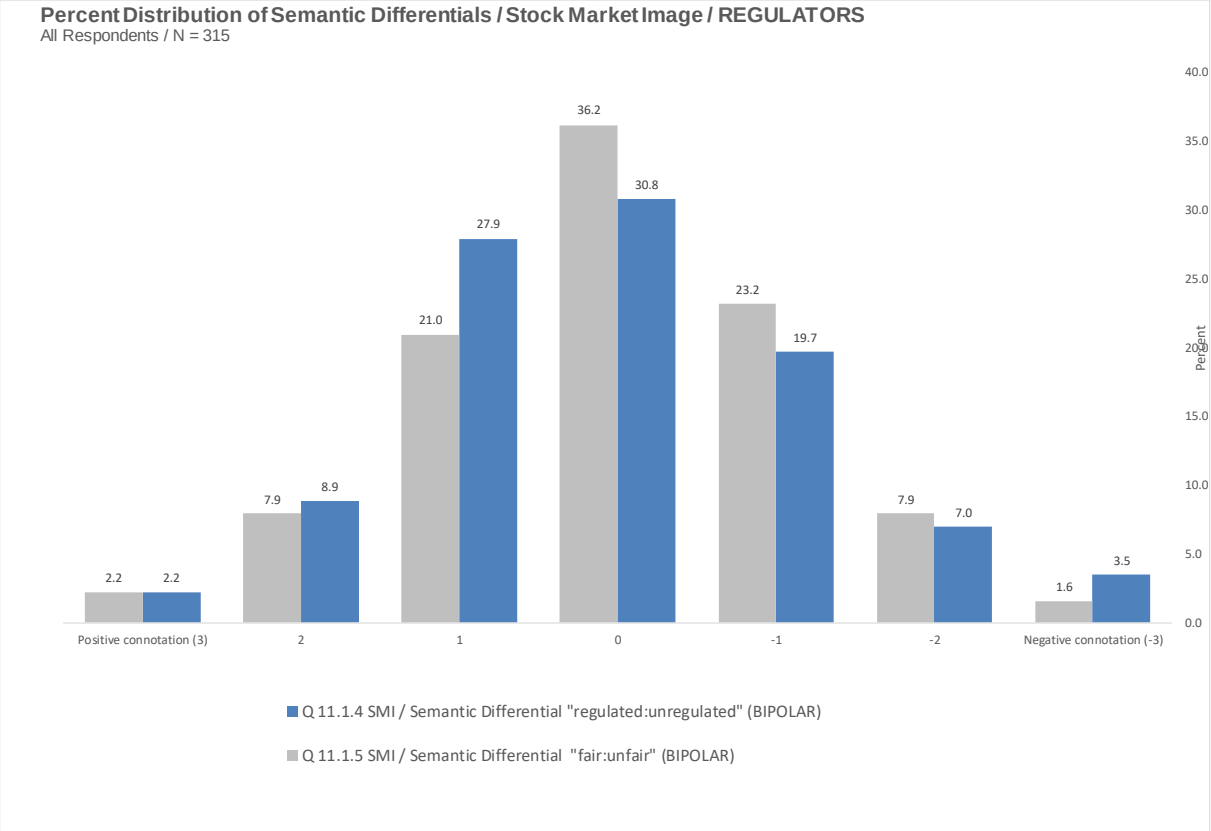
4.1.3.4.2 Direct Measurement (Semantic Differential)

The direct measurement queried the attitude towards regulators through two semantic differential statements (see Table 78 and Table 80). Both statements resulted in fairly neutral responses with a median and mode of 0.00. As a consequence, the unweighted compound score ("Score Q.11.1 Regulators") also shows an overall neutral position (mean = 0.03 and median = 0.00). Furthermore, the EVM score ("Score EVM Regulators") and the compound semantic differential score ("Score Q.11.1 Regulators") exhibit a statistically significant correlation (Pearson's r = 0.355, significant at the 0.01 level).

Table 80 - Descriptive Statistics – Attitude/Regulators (Direct Measurement)

Variable	N		Mean	Median	Mode	Std. Deviation	Attitude
	Valid	Missing					
Q 11.1.4 SMI / Semantic Differential "regulated:unregulated" (BIPOLAR)	315	0	0.0825	0.0000	0.00	1.27426	Positive
Q 11.1.5 SMI / Semantic Differential "fair:unfair" (BIPOLAR)	315	0	-0.0032	0.0000	0.00	1.19313	Negative
Score Q.11.1 REGUATORS / "Semantic Differential" (sum(Q11.1_4_BIPOLAR,Q11.1_5_BIPOLAR) / 2)	315	0	0.0302	0.0000	0.00	0.97739	Positive

Figure 12 – Frequency Distribution – Semantic Differential/Regulators



4.1.3.5 Economic Role

The economic role dimension considers the attitude of respondents towards the perceived role and importance of the stock market for the economy as a whole. The indirect and direct measures applied in accordance with the RAA for this dimension are outlined in Table 81.

Table 81 – Attitude Measurement/Economic Role

Section*)	Sub-Section*)	Role	Description	Number of Items	Scale	Measurement
			Indirect Measures			
Q.9	4	Belief Statements	Four belief statements on 7-point "Strongly agree - Strongly Disagree" scale to measure construct "Economic Role"	4	+3 to - 3 (7-point) bipolar "Strongly Agree - Disagree"	unweighted average of relevant items
Q.10	1.6	Outcome Evaluation	Consideration of Risk and Rewards	1	+3 to - 3 (7-point) bipolar "Extremely Desirable - Undesirable"	singular item
			Direct Measures			
Q.11	1	Attitude - Direct Measurement (Semantic Differential)	Two direct measures Q.11.1.6 - Consideration of stock market being "beneficial vs. Unbeneficial to the economy" Q.11.1.7 - Consideration of stock market being "beneficial vs. Unbeneficial to society"	2	7-point Semantic Differential	unweighted average of relevant items

) Section and Sub-Section Figures correspond to the Survey Question Numbering as outlined in **Appendix C.*

4.1.3.5.1 Indirect Measurement (EVM)

The belief statements concerning stock markets' economic role indicate that respondents overall perceive stock markets to assume an important role (Table 82 and Figure 13). In particular, the perception that stock markets play an important role in supporting economic growth (Q.9.4.1) yields an overall positive belief (mean = 1.05, mode = 1.00). Similarly, the overall score (Score Q.9.4: mean = 0.84, mode = 0.00) indicates that there is in general a slightly positive belief regarding stock markets' economic role.

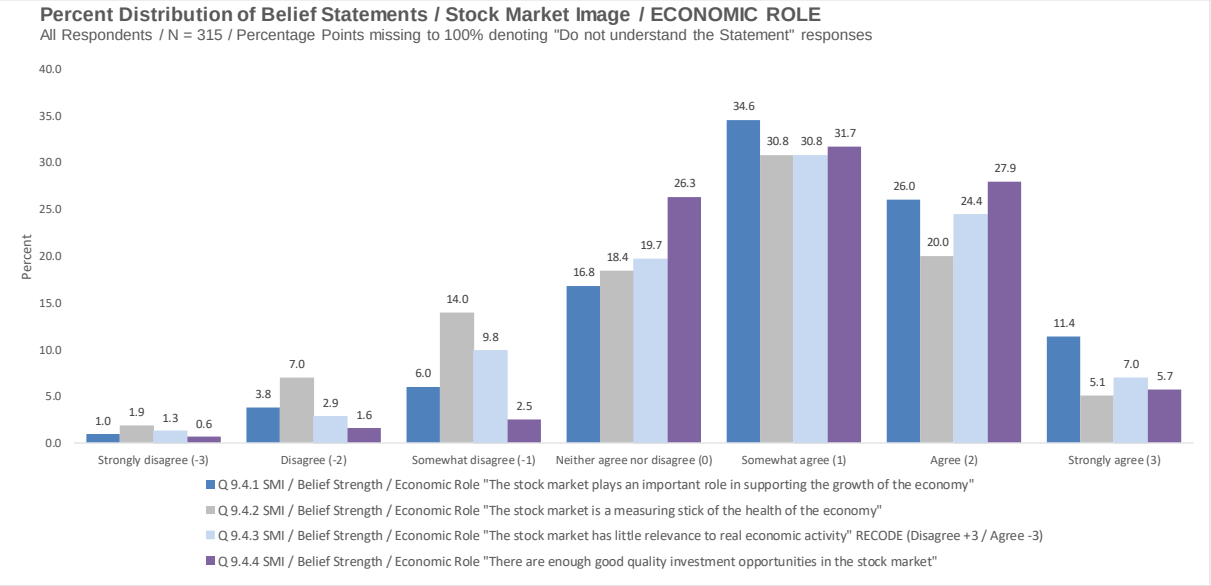
Table 82 - Descriptive Statistics – Attitude/Economic Role (Indirect Measurement)

Variable	N		Mean	Median	Mode	Std. Deviation	Attitude
	Valid	Missing*)					
Q 9.4.1 SMI / Belief Strength / Economic Role "The stock market plays an important role in supporting the growth of the economy"	314	1	1.0478	1.0000	1.0000	1.2768	Agree
Q 9.4.2 SMI / Belief Strength / Economic Role "The stock market is a measuring stick of the health of the economy"	306	9	0.5392	1.0000	1.0000	1.3909	Agree
Q 9.4.3 SMI / Belief Strength / Economic Role "The stock market has little relevance to real economic activity" RECODE	302	13	0.8477	1.0000	1.0000	1.2746	Agree
Q 9.4.4 SMI / Belief Strength / Economic Role "There are enough good quality investment opportunities in the stock market"	304	11	1.0066	1.0000	1.0000	1.0778	Agree
Score Q9.4 Economic Role BIPOLAR	314	1	0.8408	0.7500	0.0000	0.8545	Agree

**) Missing entries denote the response "Do not understand the statement"*

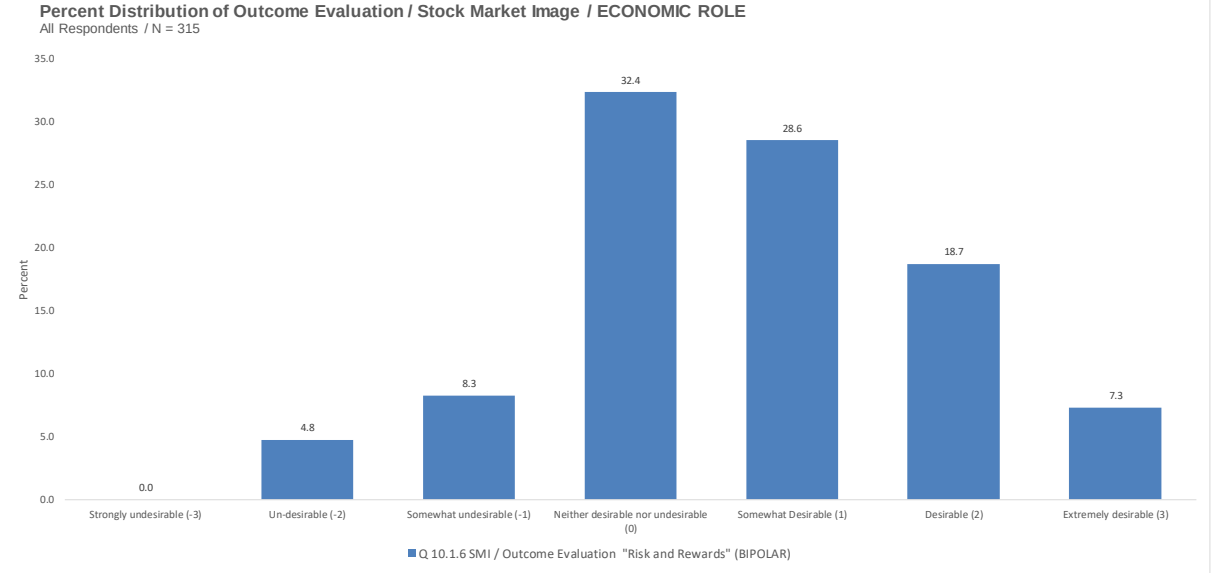
Variable	N		Mean	Median	Mode	Std. Deviation	Attitude
	Valid	Missing					
Q 10.1.6 SMI / Outcome Evaluation "Risk and Rewards" (BIPOLAR)	315	0	0.7016	1.0000	0.0000	1.2155	Desirable
Sore EVM "Economic Role" (SCO_Q.9.4_BIPOLAR * Q10.1_6_BIPOLAR)	315	0	0.8921	0.0000	0.0000	1.7922	Positive

Figure 13 – Frequency Distribution – Belief Statements/Economic Role



***Note**: For Q.9.4.3, the direction of the question is different and responses have been recoded to be comparable to the other belief statements*

Figure 14 – Frequency Distribution – Outcome Evaluation/Economic Role



In contrast, the outcome evaluation (see Figure 14) queried in a more personal way the impact of stock markets' economic role on personal considerations of SMI, and the responses indicate an overall positive evaluation (Q.10.1.6: mean = 0.70, median = 1.00, and mode = 2.00) that is roughly in line with the belief statements. Consequently, the relevant EVM score ("Score EVM Economic Role", see Table 82) is correspondingly positive overall, with a mean of 0.89.

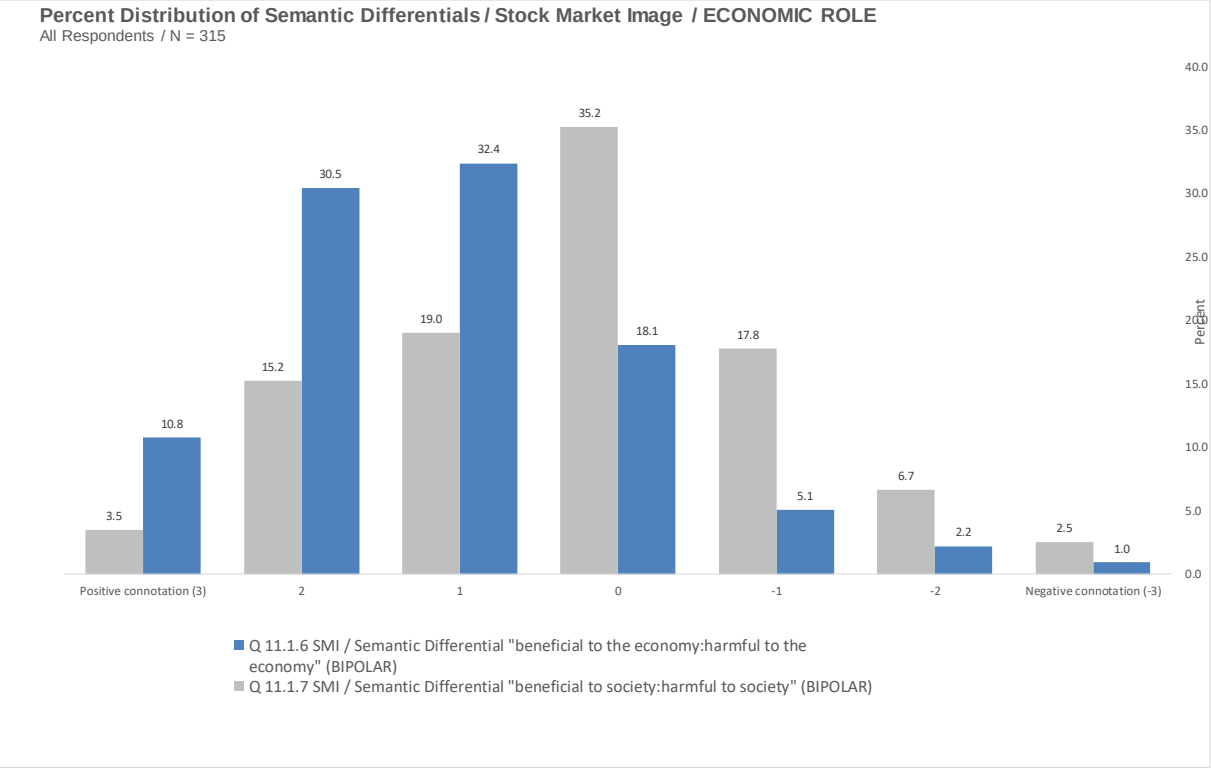
4.1.3.5.2 Direct Measurement (Semantic Differential)

The direct measurement queried the attitude towards the economic role through two semantic differential statements (see Table 83 and Table 78). Whereas Q.11.1.6 “beneficial vs. harmful to the economy” yielded a fairly positive response (mean = 1.13; median and mode = 1.00), in line with the indirect measurements, the responses to Q.11.1.7 “beneficial vs. harmful to society” were significantly more neutral (mean = 0.21; median and mode = 0.00). As a consequence, the unweighted compound score (“Score Q.11.1 Economic Role”) shows an overall positive position (mean = 0.67 and median = 0.50). Furthermore, the EVM score (“Score EVM Economic Role”) and the compound semantic differential score (“Score Q.11.1 Economic Role”) exhibit a statistically significant correlation (Pearson’s r = 0.395, significant at the 0.01 level).

Table 83 - Descriptive Statistics – Attitude/Economic Role (Direct Measurement)

Variable	N		Mean	Median	Mode	Std. Deviation	Attitude
	Valid	Missing					
Q 11.1.6 SMI / Semantic Differential "beneficial to the economy:harmful to the economy" (BIPOLAR)	315	0	1.1333	1.0000	1.0000	1.2083	Positive
Q 11.1.7 SMI / Semantic Differential "beneficial to society:harmful to society" (BIPOLAR)	315	0	0.2127	0.0000	0.0000	1.3220	Positive
Score Q.11.1 ECONOMIC ROLE / "Semantic Differential" (sum(Q11.1_6_BIPOLAR,Q11.1_7_BIPOLAR) / 2)	315	0	0.6730	0.5000	0.5000	1.1171	Positive

Figure 15 – Frequency Distribution – Semantic Differential/Economic Role



4.1.3.6 Wealth-Creating Capacity

The dimension wealth-creating capacity is defined as the extent to which the stock market is viewed as a dependable and lucrative vehicle for private investors to build financial assets (Dobni & Racine, 2015). The indirect and direct measures applied in accordance with the RAA for this dimension are outlined in Table 84.

Table 84 – Attitude Measurement/Wealth-Creating Capacity

Section*)	Sub-Section*)	Role	Description	Number of Items	Scale	Measurement
			Indirect Measures			
Q.9	5	Belief Statements	Six belief statements on 7-point "Strongly agree - Strongly Disagree" scale to measure construct "Wealth Creating Capacity"	6	+3 to - 3 (7-point) bipolar "Strongly Agree - Disagree"	unweighted average of relevant items
Q.10	1.4	Outcome Evaluation	Consideration of Wealth Creation Potential	1	+3 to - 3 (7-point) bipolar "Extremely Desirable - Undesirable"	singular item
			Direct Measures			
Q.11	1	Attitude - Direct Measurement (Semantic Differential)	Three direct measures Q.11.1.1 - Consideration of stock market being "wealth creating vs. Wealth destroying" Q.11.2.5 - Consideration of stock market investing as "rewards outweigh risks vs. Risks outweigh rewards" Q.11.3.2 - Consideration of stock market investing for one's future as "valuable vs. worthless"	3	7-point Semantic Differential	unweighted average of relevant items

) Section and Sub-Section Figures correspond to the Survey Question Numbering as outlined in* ***Appendix C.*

4.1.3.6.1 Indirect Measurement (EVM)

The responses to the six belief statements concerning stock markets' wealth-creating capacity indicate no clear tendency (see Table 85). Whereas the questions related to the risk/reward component of stock market investments received overall disagreement (Q.9.5.1: mean = -0.56; mode = -2.00/Q.9.5.3: mean = -1.14; mode = -2.00), the wealth creation potential was recognised (Q.9.5.6: mean = 0.80; mode = 1.00). Consequently, the overall score (Score Q.9.5: mean = -0.15) reflects this lack of a tendency. Nevertheless, in terms of outcome evaluation, the stock market's wealth-creating capacity was overall deemed to be clearly desirable (Q.10.1.4: mean = 1.82; median and mode = 2.00). This suggests that the stock market's wealth-creating capacity is overall recognised, albeit tempered by an awareness of the potential risks involved in SMP.

Table 85 – Descriptive Statistics – Attitude/Wealth-Creating Capacity (Indirect Measurement)

Variable	N		Mean	Median	Mode	Std. Deviation	Attitude
	Valid	Missing*)					
Q 9.5.1 SMI / Belief Strength / Wealth Creating Capacity "The greater financial risk is being out of the stock market rather than being in it."	303	12	-0.5578	-1.0000	-2.0000	1.7039	Disagree
Q 9.5.2 SMI / Belief Strength / Wealth Creating Capacity "The benefits of investing in the stock market outweigh the costs."	308	7	0.3149	0.0000	0.0000	1.3268	Agree
Q 9.5.3 SMI / Belief Strength / Wealth Creating Capacity "Investing in the stock market is one of the safest investments an investor can make."	311	4	-1.1447	-1.0000	-2.0000	1.4239	Disagree
Q 9.5.4 SMI / Belief Strength / Wealth Creating Capacity "The stock market is sound."	292	23	-0.4932	-0.5000	-1.0000	1.4081	Disagree
Q 9.5.5 SMI / Belief Strength / Wealth Creating Capacity "The odds are in favor of the individual investor making money in the stock market."	311	4	0.1318	0.0000	0.0000	1.3242	Agree
Q 9.5.6 SMI / Belief Strength / Wealth Creating Capacity "If one is serious about building wealth, the stock market as an investment vehicle cannot be ignored."	312	3	0.7981	1.0000	1.0000	1.4416	Agree
Score Q9.5 Wealth Creating Capacity BIPOLAR	315	0	-0.1492	-0.1667	-0.3333	0.9804	Disagree
Q 10.1.4 SMI / Outcome Evaluation "Stock Market Wealth Creation Potential" (BIPOLAR)	315	0	1.8159	2.0000	2.0000	1.0608	Desirable
Score EVM "Wealth Creating Potential" (SCO_Q.9.5_BIPOLAR * Q10.1_4_BIPOLAR)	315	0	-0.0275	0.0000	0.0000	2.1789	Negative
**) Missing entries denote the response "Do not understand the statement"*							

Figure 16 – Frequency Distribution – Belief Statements/Wealth-Creating Capacity

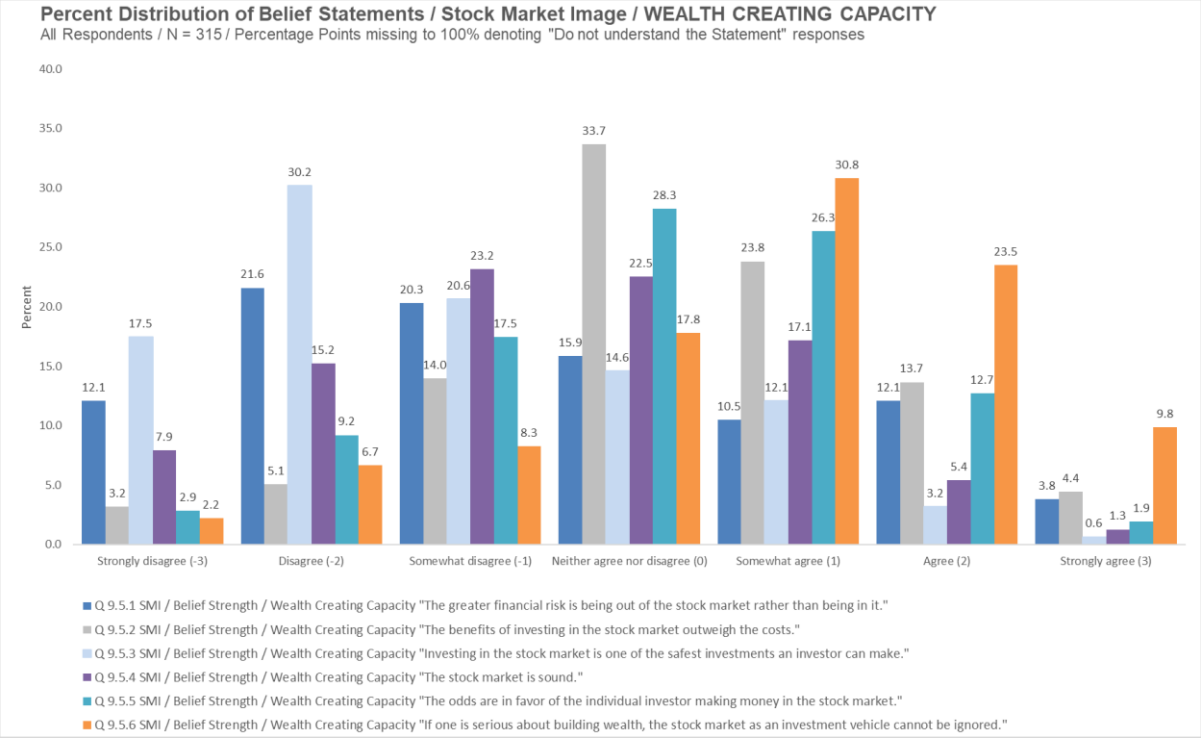
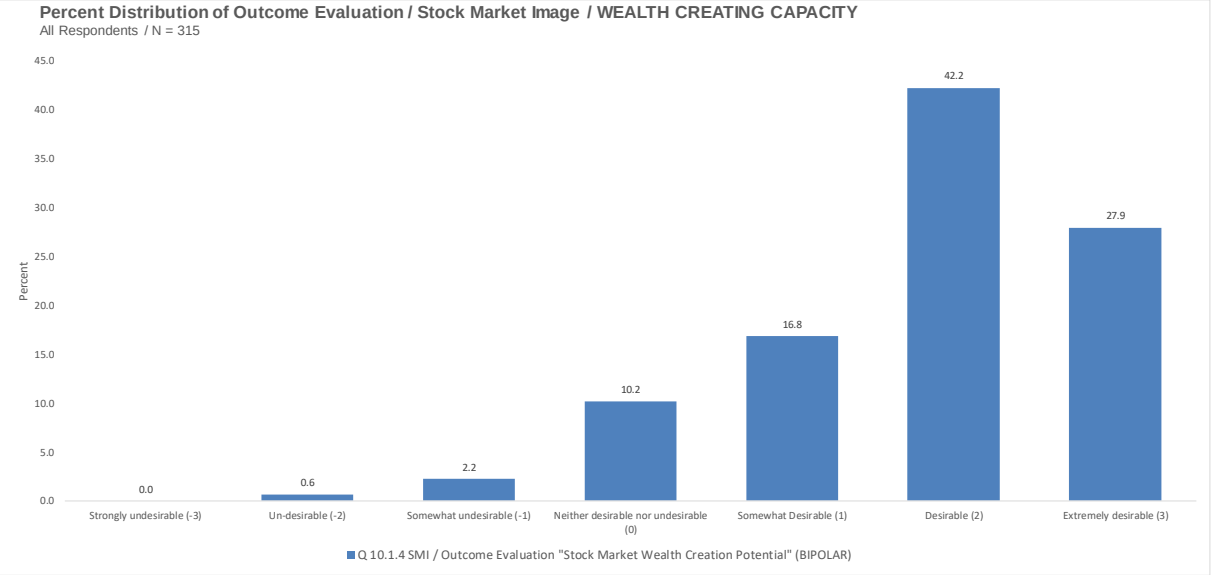


Figure 17 – Frequency Distribution – Outcome Evaluation/Wealth-Creating Capacity



Consequently, the EVM score overall results in a nearly neutral position ("Score EVM Wealth-Creating Potential"; mean = -0.03; mean and mode = 0.00; see Table 85).

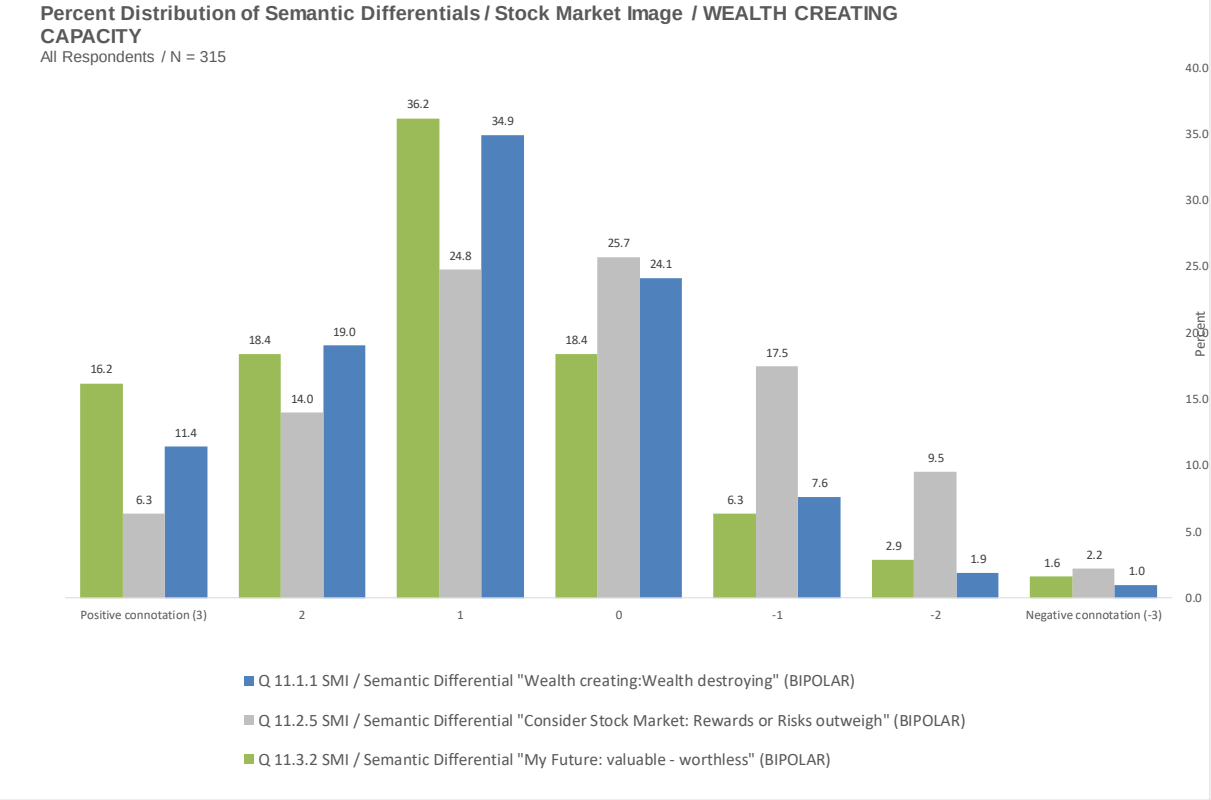
4.1.3.6.2 Direct Measurement (Semantic Differential)

In contrast to the indirect measurement, the semantic differential direct measurement indicates a clearly positive personal perception of the wealth-creating capacity. The three semantic differential items all result in positive mean values (refer to Table 86), which consequently lead to a positive overall score (Score Q.11.1 Wealth-Creating Capacity/"Semantic Differential"; mean = 0.75). The internal consistency of the direct measurement based on the EVM score (Score EVM "Wealth-Creating Capacity") and the indirect measurement based on the compound semantic differential score (Score Q.11.1 Wealth-Creating Capacity/"Semantic Differential") is deemed to be given, exhibiting a statistically significant correlation (Pearson's r = 0.607, significant at the 0.01 level).

Table 86 – Descriptive Statistics – Attitude/Wealth-Creating Capacity (Direct Measurement)

Variable	N		Mean	Median	Mode	Std. Deviation	Attitude
	Valid	Missing					
Q 11.1.1 SMI / Semantic Differential "Wealth creating:Wealth destroying" (BIPOLAR)	315	0	0.9302	1.0000	1.0000	1.2318	Positive
Q 11.2.5 SMI / Semantic Differential "Consider Stock Market: Rewards or Risks outweigh" (BIPOLAR)	315	0	0.2857	0.0000	0.0000	1.4347	Positive
Q 11.3.2 SMI / Semantic Differential "My Future: valuable - worthless" (BIPOLAR)	315	0	1.0476	1.0000	1.0000	1.3358	Positive
Score Q.11.1 Wealth Creating Capacity / "Semantic Differential" (SUM(Q11.1_1_BIPOLAR,Q11.2_5_BIPOLAR,Q11.3_2_BIPOLAR) / 3)	315	0	0.7545	0.6667	0.6667	1.1121	Positive

Figure 18 – Frequency Distribution – Semantic Differential/Wealth-Creating Capacity



4.1.3.7 Fast Money

The dimension fast money is defined as the extent to which the stock market is viewed as a venue for making quick profits (Dobni & Racine, 2015). The indirect and direct measures applied in accordance with the RAA for this dimension are outlined in Table 87.

Table 87 – Attitude Measurement/Fast Money

Section*)	Sub-Section*)	Role	Description	Number of Items	Scale	Measurement
			Indirect Measures			
Q.9	6	Belief Statements	Three belief statements on 7-point "Strongly agree - Strongly Disagree" scale to measure construct "Fast Money"	3	+3 to - 3 (7-point) bipolar "Strongly Agree - Disagree"	unweighted average of relevant items
Q.10	1.5	Outcome Evaluation	Possibility to quickly make or lose money	1	+3 to - 3 (7-point) bipolar "Extremely Desirable - Undesirable"	singular item
			Direct Measures			
Q.11	2	Attitude - Direct Measurement (Semantic Differential)	Two direct measures Q.11.2.2 - Consideration of stock market investing as "Long-term vs. Short-term" Q.11.2.4 - Consideration of stock market investing as "Investing vs. Gambling"	2	7-point Semantic Differential	unweighted average of relevant items

) Section and Sub-Section Figures correspond to the Survey Question Numbering as outlined in* ***Appendix C.*

4.1.3.7.1 Indirect Measurement (EVM)

The indirect measurement is based on three belief statements as well as one item for outcome evaluation (see Table 87 and Table 88). To ensure consistency with the semantic differential direct measurement, which scores a long-term view as positive and a short-term view as negative (see section 4.1.3.7.2 for details), the scales for the indirect measurement have been inverted so that agreement with and, respectively, desirability of a “fast-money” nature is scored negatively whereas disagreement and undesirability are scored positively.

The responses to the three belief statements concerning stock markets’ fast-money characteristics indicate no clear tendency (see Table 88). Whereas questions Q.9.6.1 (mean = -0.16 and mode = -1.00) and Q.9.6.3 (mean = 0.13 and mode = -1.00) were overall inconclusive regarding respondents’ tendency, the responses to Q.9.6.2 (mean = 0.54 and mode = 1.00) indicated scepticism of the fast-money characteristics. Consequently, the overall compound belief score (Score Q.9.6: mean = 0.17) reflects this lack of tendency, which is reiterated in terms of the outcome evaluation (Q.10.1.5 SMI/Outcome Evaluation “Possibility to make or lose money quickly”: mean = -0.23 and mode = 0.00) and consequently also reflected in the EVM score (Score EVM “Fast Money – Recode”: mean = 0.53; mode and median = 0.00).

Table 88 – Descriptive Statistics – Attitude/Fast Money (Indirect Measurement)

Variable	N		Mean	Median	Mode	Std. Deviation	Attitude
	Valid	Missing*)					
Q 9.6.1 SMI / Belief Strength / Fast Money "The key to successful stock market investing is hot tips." (RECODE, SCALE INVERTED)	314	1	-0.1561	0.0000	-1.0000	1.3930	Agree
Q 9.6.2 SMI / Belief Strength / Fast Money "Investing in the stock market is a way to make money easily and quickly." (RECODE, SCALE INVERTED)	314	1	0.5350	1.0000	1.0000	1.5726	Disagree
Q 9.6.3 SMI / Belief Strength / Fast Money "If you are smart, it is easy to pick individual stocks that will have better than average returns" (RECODE, SCALE INVERTED)	309	6	0.1262	0.0000	-1.0000	1.4706	Disagree
Score Q9.6 Fast Money BIPOLAR SCALE INVERTED	315	0	0.1672	0.0000	0.0000	1.0715	Disagree
Q 10.1.5 SMI / Outcome Evaluation "Possibility to quickly make or lose money" (BIPOLAR / RECODE. SCALE INVERTED)	315	0	-0.2317	0.0000	0.0000	1.4188	Undesirable
Score EVM "Fast Money - Recode" (SCO_Q.9.6_BIPOLAR_RECODE * Q10.1_5_BIPOLAR_RECODE)	315	0	0.5270	0.0000	0.0000	1.5954	Positive
**) Missing entries denote the response "Do not understand the statement"*							

Figure 19 – Frequency Distribution – Belief Statements/Fast Money

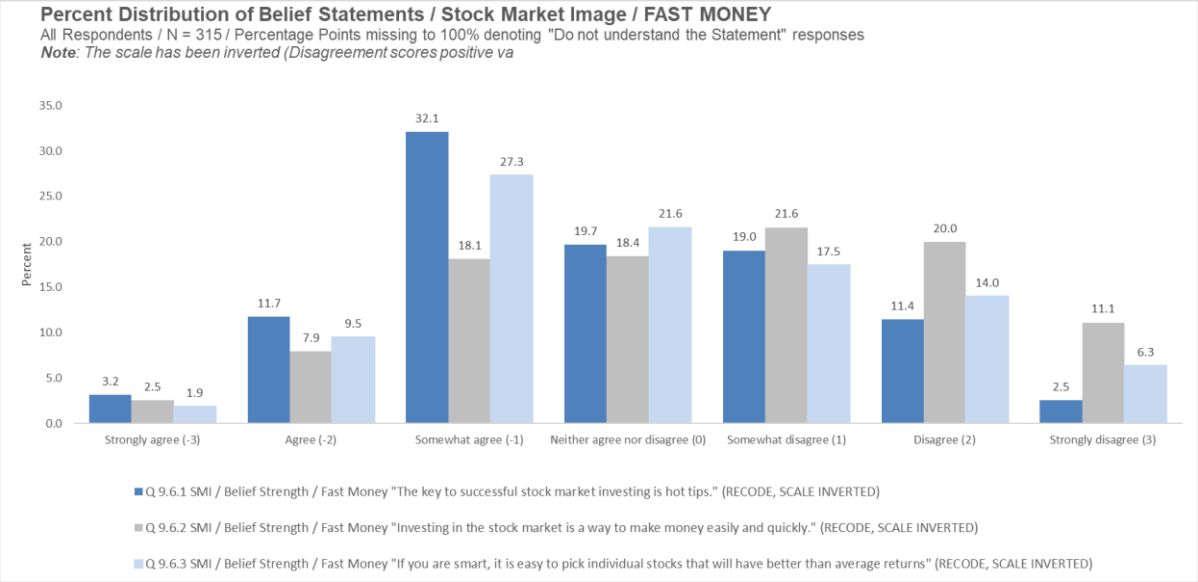
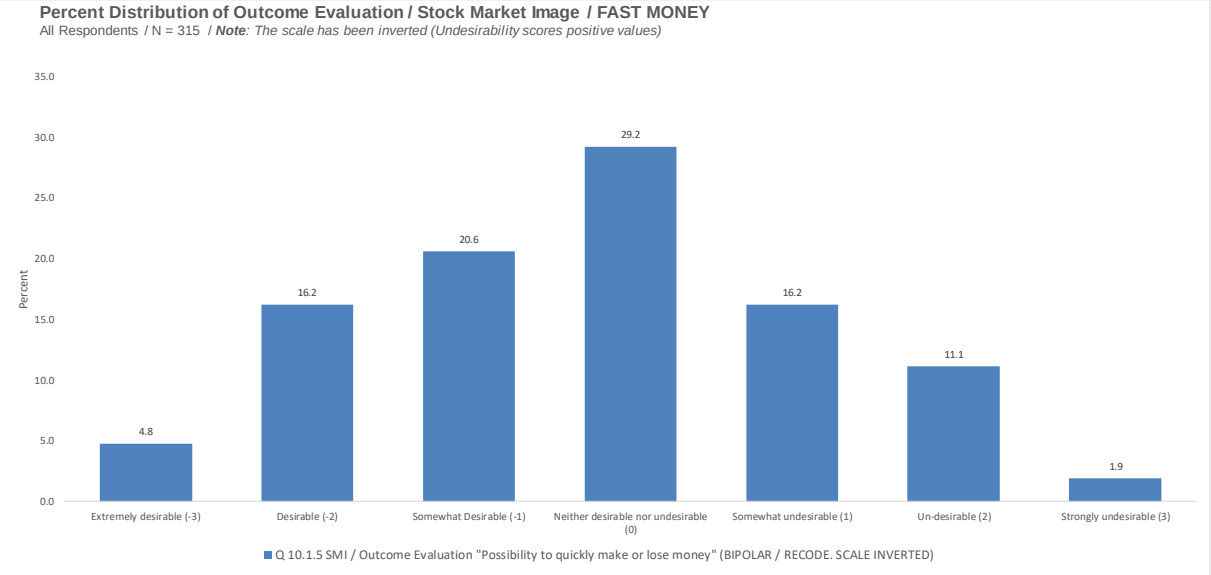


Figure 20 – Frequency Distribution – Outcome Evaluation/Fast Money



4.1.3.7.2 Direct Measurement (Semantic Differential)

In contrast to the indirect measurement, the semantic differential direct measurement indicates a clearly positive score, which corresponds to a personal perception of the long-term investing nature of the stock market as opposed to a short-term/gambling perception. The two semantic differential items both result in positive mean values (see to Table 89), which consequently lead to a positive overall score (Score Q.11.1 Fast Money/"Semantic Differential"; mean = 0.86; median = 1.00; mode = 2.00). In contrast to other attitude dimensions, "fast money" does not register a statistically significant correlation between direct and indirect measures.

Table 89 – Descriptive Statistics – Attitude/Fast Money (Direct Measurement)

Variable	N		Mean	Median	Mode	Std. Deviation	Attitude
	Valid	Missing					
Q 11.2.2 SMI / Semantic Differential "Consider Stock Market: long-term - short-term" (BIPOLAR)	315	0	1.1746	1.0000	2.0000	1.4337	Positive
Q 11.2.4 SMI / Semantic Differential "Consider Stock Market: Investing - Gambling" (BIPOLAR)	315	0	0.5524	1.0000	2.0000	1.6080	Positive
Score Q.11.1 FAST MONEY / "Semantic Differential" (SUM(Q11.2_2_BIPOLAR,Q11.2_4_BIPOLAR) / 2)	315	0	0.8635	1.0000	2.0000	1.2715	Positive

Figure 21 – Frequency Distribution – Semantic Differential/Fast Money

4.1.3.8 Fairness/Tilted Playing Field

The dimension fairness/tilted playing field is defined as the extent to which the stock market is perceived to favour large, sophisticated (institutional) investors at the expense of private investors (Dobni & Racine, 2015). The indirect and direct measures applied in accordance with the RAA for this dimension are outlined in Table 90.

Table 90 – Attitude Measurement/Fairness–Tilted Playing Field

Section*)	Sub-Section*)	Role	Description	Number of Items	Scale	Measurement
			Indirect Measures			
Q.9	7	Belief Statements	Three belief statements on 7-point "Strongly agree - Strongly Disagree" scale to measure construct "Fairness / Tilted Playing Field"	3	+3 to - 3 (7-point) bipolar "Strongly Agree - Disagree"	unweighted average of relevant items
Q.10	1.7	Outcome Evaluation	Fairness of the stock market towards small investors	1	+3 to - 3 (7-point) bipolar "Extremely Desirable - Undesirable"	singular item
			Direct Measures			
Q.11	5	Attitude - Direct Measurement (Semantic Differential)	One direct measure Q.11.1.5 Consideration of Stock Market "fair vs. unfair"	1	7-point Semantic Differential	singular item

) Section and Sub-Section Figures correspond to the Survey Question Numbering as outlined in **Appendix C.*

4.1.3.8.1 Indirect Measurement (EVM)

The indirect measurement is based on three belief statements as well as one item for outcome evaluation (see Table 90 and Table 91). To ensure consistency with the semantic differential direct measurement, which scores the perception that the stock market is fair as positive (see section 4.1.3.7.2 for details), the indirect measurement scales have been inverted so that

agreement with the stock market being “controlled” by large investors and, respectively, the “difficulty of small investors to be successful” is scored negatively whereas disagreement is scored positively.

The indirect measurement based on belief statements indicated that, while the respondents are more inclined to hold the belief that the stock market is controlled by large investors (Q.9.7.1: mean = -0.82; median and mode = -1.00) and that only highly skilled investors can consistently generate returns (Q.9.7.2: mean = -0.42; median and mode = -1.00), in terms of the outcome evaluation, the respondents clearly indicated that, when considering the “fairness of the stock market”, SMP is desirable (Q.10.1.7: mean = 1.56; median and mode = 2.00). In consequence, the EVM score (Score EVM “Fairness/Tilted Playing Field”: mean = -0.56; median and mode = 0.00) does not show a clear inclination.

Table 91 – Descriptive Statistics – Attitude/Fairness–Tilted Playing Field (Indirect Measurement)

Variable	N		Mean	Median	Mode	Std. Deviation	Attitude
	Valid	Missing*)					
Q 9.7.1 SMI / Belief Strength / Level Playing Field "The stock market is controlled by large (institutional) investors." SCALE INVERTED	306	9	-0.8203	-1.0000	-1.0000	1.1582	Agree
Q 9.7.2 SMI / Belief Strength / Level Playing Field "Only highly skilled investors can consistently make money in the stock market" SCALE INVERTED	313	2	-0.4217	-1.0000	-1.0000	1.4526	Agree
Q 9.7.3 SMI / Belief Strength / Level Playing Field "It is difficult for small investors to make money in the stock market." SCALE INVERTED	313	2	0.2620	0.0000	1.0000	1.4941	Disagree
Score Q9.7 Tilted Playing Field BIPOLAR_SCALE INVERTED	313	2	-0.3206	-0.3333	-0.3333	1.0245	Agree
Q 10.1.7 SMI / Outcome Evaluation "Fairness of the stock market towards small investors" (BIPOLAR)	315	0	1.5206	2.0000	2.0000	1.3314	Desirable
Score EVM "Fairness / Tilted Playing Field" (SCO_Q.9.7_BIPOLAR * Q10.1_7_BIPOLAR)	314	1	-0.5605	0.0000	0.0000	2.2013	Negative
**) Missing entries denote the response "Do not understand the statement"*							

Figure 22 – Frequency Distribution – Belief Statements/Fairness–Tilted Playing Field

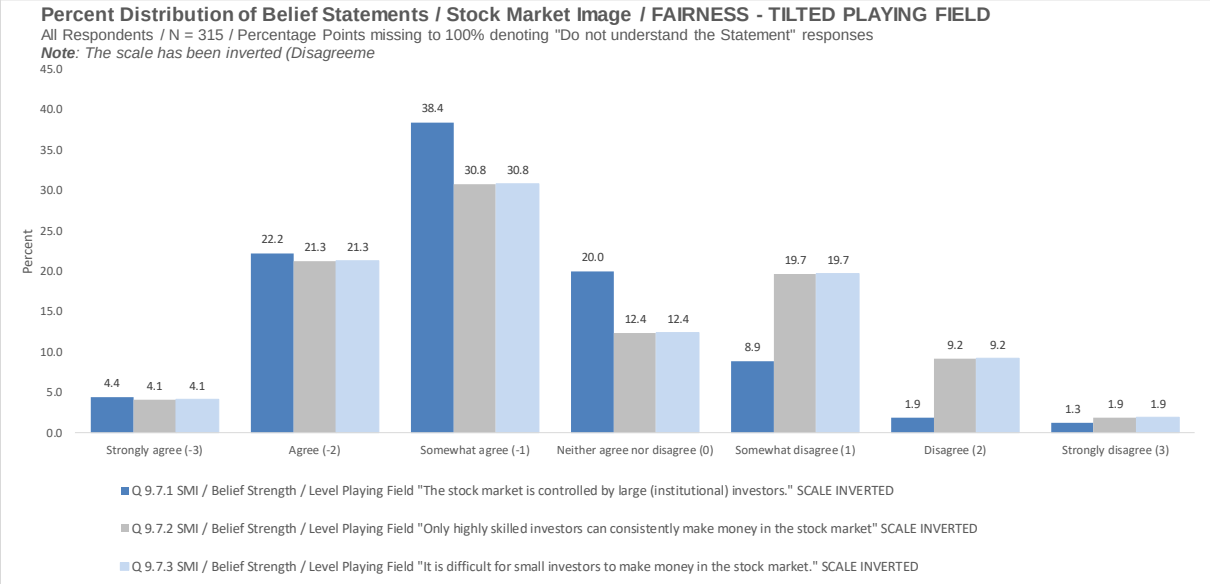
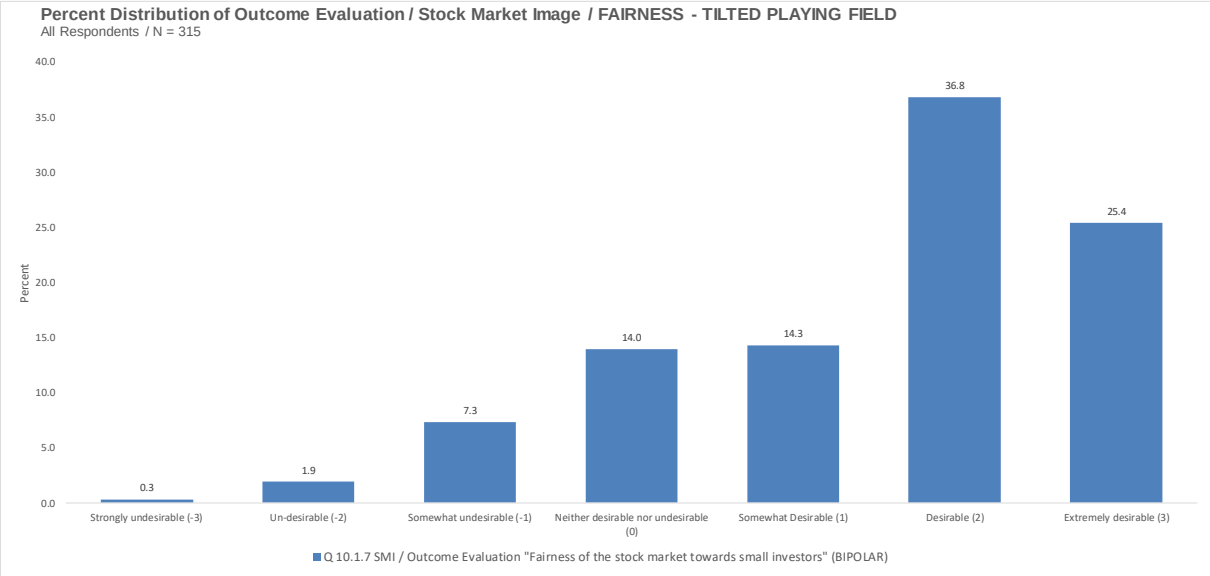


Figure 23 – Frequency Distribution – Outcome Evaluation/Fairness–Tilted Playing Field



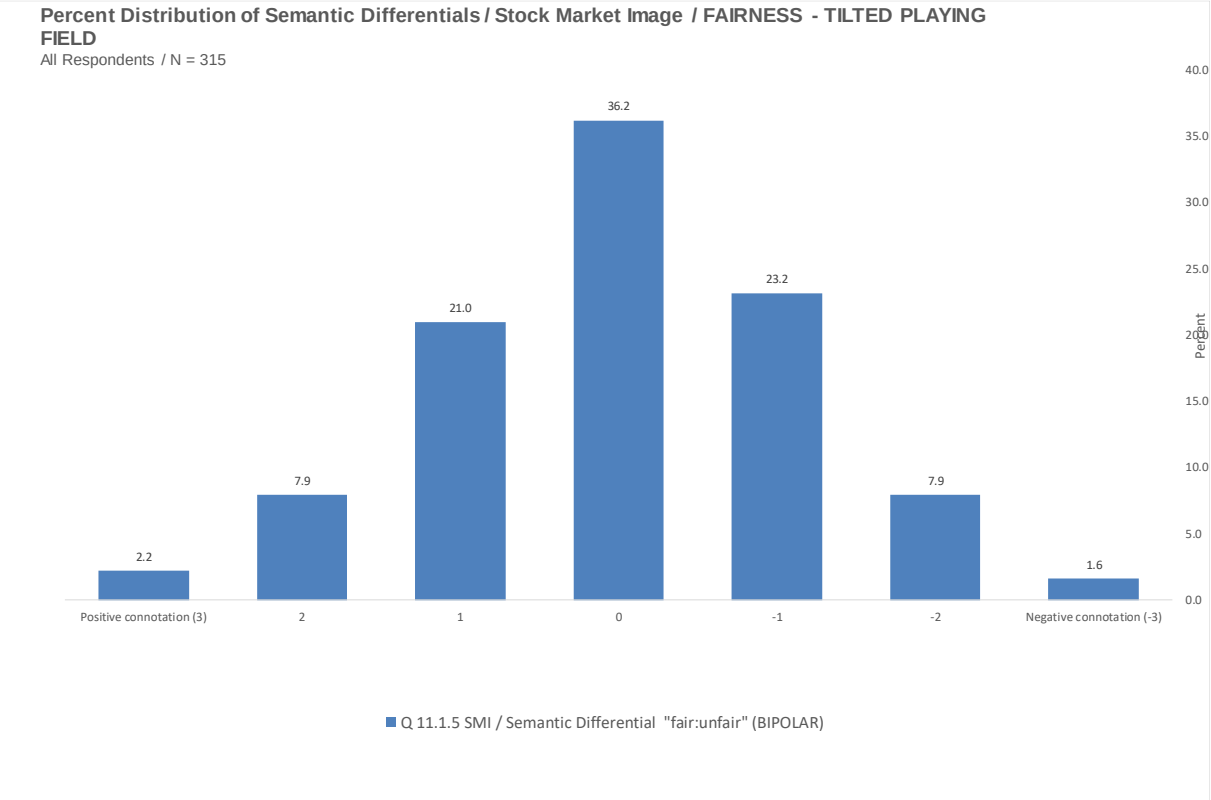
4.1.3.8.2 Direct Measurement (Semantic Differential)

Similar to the indirect measurement, the semantic differential direct measurement indicates overall a clearly neutral position towards the “fairness” perception (Q 11.1.5 SMI/Semantic Differential “fair: unfair” (BIPOLAR): mean = -0.00; median and mode = 0.00). The internal consistency of the direct measurement based on the EVM score (Score EVM “Fairness/Tilted Playing Field”) and the indirect measurement based on the semantic differential score (Score Q.11.1.5) was deemed to be given, exhibiting a statistically significant correlation (Pearson’s r = 0.244, significant at the 0.01 level).

Table 92 – Descriptive Statistics – Attitude/Fairness–Tilted Playing Field (Direct Measurement)

Variable	N		Mean	Median	Mode	Std. Deviation	Attitude
	Valid	Missing					
Q 11.1.5 SMI / Semantic Differential "fair:unfair" (BIPOLAR)	315	0	-0.0032	0.0000	0.0000	1.1931	Negative

Figure 24 – Frequency Distribution – Semantic Differential/Fairness–Tilted Playing Field



4.1.4 Perceived Social Norms and Normative Beliefs

4.1.4.1 Composite PSN Scores

The definitions for the composite perceived norm scores are outlined in section 3.2.2.2.3.2. Table 93 summarises the descriptive statistics for the composite norm score. The overall mean (mean = 9.90 with std deviation = 14.32) indicates a slightly positive PSN score, suggesting that overall salient referents exert a positive normative influence on the respondents. The composite injunctive norm score and the composite descriptive norm score exhibit a positive correlation ($r = 0.353$, $p < 0.01$).

Table 93 – Descriptive Statistics/Composite Perceived Norm Scores

	N	Range	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Composite Injunctive Norm Score	284	93.00	-38.00	55.00	8.9718	12.64042	0.126	0.145	2.426	0.288
Composite Descriptive Norm Score	314	23.00	-9.00	14.00	1.8153	4.20303	-0.071	0.138	-0.167	0.274
Composite Perceived Norm Score	315	105.00	-43.00	62.00	9.8984	14.32435	0.189	0.137	1.486	0.274

4.1.4.2 Injunctive and Descriptive Norms

Injunctive norms N_I are based on the normative belief about a referent as well as the motivation to comply with a specific referent (see section 3.2.2.2.3 and Equation 1). By considering the component factors in isolation, it can be noted that all the referents had a positive to neutral normative belief in SMP. The referents rated as most approving of SMP (scored on a five-point bipolar scale including an "N/A" option, positive values indicating approval) are "father/male guardian" (mean = 0.54), "educators" (mean = 0.49), and most notably "financial services professional" (mean = 1.02). Similarly, considering the factor "motivation to comply" (scored on a four-point unipolar scale, higher values indicating higher value attached to the referent), the referent "father/male guardian" (mean = 3.08, mode = 4.00) obtained the highest rating, with 75.1% of all responses indicating that the respondents "highly value" or "value" the referent's opinion. In contrast, the referent "public opinion" (mean = 1.72; mode = 1.00) received the lowest motivation to comply, with only 15.5% of responses indicating "highly value" or "value".

Consequently, the referents "father/male guardian" (mean = 1.91), "educators" (mean = 1.33), and most notably "financial services professional" (mean = 2.46) are the highest injunctive norm factors. Similarly to the injunctive norms, the descriptive norm assessment (see Figure 26) yielded the finding that referents "parents/legal guardian" (mean = 0.31; no differentiation between male and female guardian), "educators" (mean = 0.50), and most notably "financial services professional" (mean = 1.25) are considered to be most likely investing in the stock

market themselves. Furthermore, the injunctive and descriptive norms display a consistently significant degree of correlation. The more specific the salient referent is, the higher the correlation appears to be.

Figure 25 – Overview of Injunctive Norms, Normative Beliefs, and Motivation to Comply

Salient Referent	Normative Belief n_i *Mean of 5-Point Bi-Polar Scale* [1]	Motivation to Comply m_i *Mean of 4-Point Unipolar Scale* [2]	Injunctive Norm N_I $N_I = n_i \times m_i$
Father (male guardian)	0.54	3.08	1.91
Mother (female guardian)	0.00	2.85	0.21
Siblings (e.g. brothers or sisters)	0.35	2.61	1.20
Partner (e.g. spouse; boy- or girlfriend)	0.35	2.91	1.28
Educators (e.g. teachers or professors)	0.49	2.53	1.33
Best Friend	0.40	2.66	1.18
Social Peers	0.34	2.24	0.80
Financial services professional	1.02	2.35	2.46
Public Opinion	0.29	1.72	0.64

1) Normative Belief Bipolar Scale: +2 = Strongly Approve to -2 = Strongly Disapprove
2) Motivation to Comply Unipolar Scale: +4 = Highly Value to 1 = Do not Value

Figure 26 – Overview of Injunctive and Descriptive Norms and Correlations

Salient Referent	Injunctive Norm N_I $N_I = n_i \times m_i$	Descriptive Norm N_D [1] *Mean of 5-Point Bi-Polar Scale* [2]	Correlation r [3]
Father (male guardian)	1.91	0.31	0.59
Mother (female guardian)	0.21		0.39
Siblings (e.g. brothers or sisters)	1.20	-0.21	0.37
Partner (e.g. spouse; boy- or girlfriend)	1.28	-0.12	0.40
Educators (e.g. teachers or professors)	1.33	0.50	0.38
Best Friend	1.18	-0.09	0.52
Social Peers	0.80	0.26	0.27
Financial services professional	2.46	1.25	0.37
Public Opinion	0.64	N/A	N/A

1) Descriptive Norm was assessed for Parents (Legal Guardians) jointly and not assessed for "Public Opinion" as category was deemed to unspecific for Descriptive Assessment
2) Descriptive Norms 5-Point Bi-Polar Scale: +2 = Definitely Yes to -2 = Definitely No
3) all Correlations (Pearson r) noted are significant at the $p<0.01$ level (2-tailed).

Figure 27 – Univariate Statistics – Injunctive Norms

		Injunctive Norm: Father (male guardian) (Q12.2_1_1_BIPOLAR * Q12.2_2_1)	Injunctive Norm: Mother (female guardian) (Q12.2_1_2_BIPOLAR * Q12.2_2_2)	Injunctive Norm: Siblings (e.g. brothers or sisters) (Q12.2_1_3_BIPOLAR * Q12.2_2_3)	Injunctive Norm: Partner (e.g. spouse; boy- or girlfriend) (Q12.2_1_4_BIPOLAR * Q12.2_2_4)	Injunctive Norm: Educators (e.g. teachers or professors) (Q12.2_1_5_BIPOLAR * Q12.2_2_5)	Injunctive Norm: Best Friend (Q12.2_1_6_BIPOLAR * Q12.2_2_6)	Injunctive Norm: Social Peers (Q12.2_1_7_BIPOLAR * Q12.2_2_7)	Injunctive Norm: Financial services professional (Q12.2_1_8_BIPOLAR * Q12.2_2_8)	Injunctive Norm: Public Opinion (Q12.2_1_9_BIPOLAR * Q12.2_2_9)
N	Valid	250	252	242	193	219	238	241	229	235
	Missing	65	63	73	122	96	77	74	86	80
Mean		1.9080	0.2103	1.2025	1.2850	1.3288	1.1765	0.8008	2.4629	0.6426
Median		2.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	2.0000	0.0000
Mode		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Std. Deviation		3.55275	3.13307	2.70168	2.86622	2.39105	2.80941	1.95623	2.47880	1.79978
Skewness		-0.101	-0.117	0.450	0.068	0.688	0.292	0.218	0.414	1.403
Std. Error of Skewness		0.154	0.153	0.156	0.175	0.164	0.158	0.157	0.161	0.159
Kurtosis		-0.023	0.824	1.111	0.888	0.799	0.876	1.919	-0.324	4.403
Std. Error of Kurtosis		0.307	0.306	0.312	0.348	0.327	0.314	0.312	0.320	0.316
Minimum		-8.00	-8.00	-8.00	-8.00	-4.00	-8.00	-6.00	-4.00	-4.00
Maximum		8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00

Figure 28 – Univariate Statistics – Descriptive Norms

		Q 12.3.1 Descriptive Norm: Parents (Legal Guardians) BIPOLAR	Q 12.3.2 Descriptive Norm: Siblings (e.g. brothers or sisters) BIPOLAR	Q 12.3.3 Descriptive Norm: Partner (e.g. spouse; boy- or girlfriend) BIPOLAR	Q 12.3.4 Descriptive Norm: Educators (e.g. teachers or professors) BIPOLAR	Q 12.3.5 Descriptive Norm: Best friend BIPOLAR	Q 12.3.6 Descriptive Norm: Social peers (colleagues / fellow students / friends) BIPOLAR	Q 12.3.7 Descriptive Norm: Financial services professional (e.g. bank advisor) BIPOLAR
N	Valid	305	269	193	275	296	303	290
	Missing	10	46	122	40	19	12	25
Mean		0.3148	-0.2082	-0.1192	0.5018	-0.0878	0.2574	1.2517
Median		1.0000	0.0000	0.0000	1.0000	0.0000	0.0000	1.0000
Mode		2.00	-2.00	0.00	1.00	0.00	0.00	1.00
Std. Deviation		1.59747	1.37995	1.31549	0.99037	1.20129	0.93128	0.80789
Skewness		-0.320	0.173	0.125	-0.346	0.040	-0.113	-1.124
Std. Error of Skewness		0.140	0.149	0.175	0.147	0.142	0.140	0.143
Kurtosis		-1.485	-1.205	-1.051	-0.281	-0.925	-0.224	1.292
Std. Error of Kurtosis		0.278	0.296	0.348	0.293	0.282	0.279	0.285
Range		4.00	4.00	4.00	4.00	4.00	4.00	4.00
Minimum		-2.00	-2.00	-2.00	-2.00	-2.00	-2.00	-2.00
Maximum		2.00	2.00	2.00	2.00	2.00	2.00	2.00

4.1.5 Perceived Behavioural Control and Control Beliefs

As outlined in 3.2.2.2.1, the variable perceived behaviour control was assessed through three concepts outlined in Table 94. The composite scores were calculated as outlined in section 3.2.2.2.1.2. In the first step, the composite attitude scores were analysed before each component was assessed individually.

Table 94 – Perceived Behavioural Control Measurement

Section*)	Sub-Section*)	Role	Description	Number of Items	Scale
Q.7	2	Control Beliefs	Four belief statements on 7-point "Strongly agree - Strongly Disagree" scale on perception of own financial skills and knowledge	4	+7 to 1 (7-point) unipolar "Strongly Agree - Strongly Disagree"
Q.7	3	Self Assessment of Financial Knowledge	Four self assessment items on 7-point unipolar "Excellent knowledge - No knowledge" scale for self-assessing financial knowledge	4	+7 to 1 (7-point) unipolar "Excellent Knowledge - No Knowledge"
Q.7	4	Perceived Behavioural Control	Three items to measure comfort level (perceived behavioural control) to engage in relevant financial behaviour on a 5-point unipolar "very sure - not sure at all" scale	3	+5 to 1 (5-point) unipolar "Very sure - not sure at all"

) Section and Sub-Section Figures correspond to the Survey Question Numbering as outlined in* ***Appendix C.*

4.1.5.1 Composite Perceived Behavioural Control Scores

Table 95 summarises the descriptive statistics for the composite perceived behavioural control score. The overall mean (mean = 14.32 with std deviation = 4.07) indicates an overall negative PBC assessment.

Table 95 – Descriptive Statistics/Composite PBC Scores

	N	Range	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Composite PBC Control Belief Score	315	6.00	1.00	7.00	3.8127	1.31376	0.063	0.137	-0.426	0.274
Composite PBC Self-Assessment Score	315	6.00	1.00	7.00	3.8817	1.10771	0.271	0.137	-0.252	0.274
Composite PBC Comfort Score	315	6.00	1.00	7.00	3.9397	1.25382	0.187	0.137	-0.566	0.274
Composite PBC Certainty Score	315	4.00	1.00	5.00	2.6841	0.90173	0.182	0.137	-0.470	0.274
Composite Perceived Behavioural Control Score	315	20.17	5.00	25.17	14.3183	4.06692	0.279	0.137	-0.448	0.274

For the purpose of analysing the potential association of salient background factors, the composite PBC score was recoded in a dichotomous variable ("SCO_PBC_Dichotomous") based on whether the score indicated a positive (score greater 15) or neutral or, respectively, negative (score of 15 or lower) attitude. The Pearson chi-square test was utilised to establish a statistically significant association and Cramer's V to evaluate the strength of the association. Significant associations were identified for the factors "practical SMP experience" (ΦC = 0.511), "personal finance education" (ΦC = 0.211), "study subject" (ΦC = 0.193), and "TOK adequacy" (ΦC = 0.358), suggesting that practical and/or theoretical experience and exposure to financial topics are associated with a more positive PBC. Also noticeable is the strong association of "sex" (ΦC = 0.390), with female respondents self-assessing their PBC significantly more negatively than male respondents. "Risk aversion" (ΦC = 0.279) and "risk aversion grouping" (ΦC = 0.298) also registered significant associations.

Figure 29 – Composite PBC Score (Dichotomous) by Background Factor

Factor	Categories	N	Composite Perceived Behavioural Control Score Dichotomous ("SCO_PBC_DICHOTOMOUS")					Composite PBC Score[1)]	
			Positive (Score > 0)	Neutral or Negative (Score <= 0)	Pearson Chi-Square test	Association statistically significant?	Cramer's V	Mean	Std. Deviation
Nationality	International	49	36.7%	63.3%				13.808	3.742
	Germany	266	41.0%	59.0%	0.636	No	0.031	14.412	4.124
	Total	315	40.3%	59.7%				14.318	4.067
Sex	Male	171	57.9%	42.1%				15.723	4.052
	Female	144	19.4%	80.6%	0.000	Yes	0.390	12.651	3.412
	Total	315	40.3%	59.7%				14.318	4.067
Study Subject	Non-Business Student	190	32.6%	67.4%				13.661	4.079
	Business Student	125	52.0%	48.0%	0.001	Yes	0.193	15.317	3.854
	Total	315	40.3%	59.7%				14.318	4.067
Personal Finance Education received prior to university studies	No	225	33.8%	66.2%				13.706	3.922
	Yes	90	56.7%	43.3%	0.000	Yes	0.211	15.848	4.041
	Total	315	40.3%	59.7%				14.318	4.067
Background - Education Legal Guardian	Not Applicable	7	28.6%	71.4%				12.679	3.521
	Non-Academic	165	3.7.6%	62.4%	0.442	No	0.074	13.954	4.154
	Academic	143	44.1%	55.9%				14.819	3.948
	Total	315	40.3%	59.7%				14.318	4.067
Practical Experience SMP	No	221	24.0%	76.0%				12.825	3.362
	Yes	94	78.7%	21.3%	0.000	Yes	0.511	17.830	3.369
	Total	315	40.3%	59.7%				14.318	4.067
Risk Aversion (based on Q.6.1)	No or Do not Know	177	28.2%	71.8%				13.271	3.775
	Yes	138	55.8%	44.2%	0.000	Yes	0.279	15.661	4.045
	Total	315	40.3%	59.7%				14.318	4.067
Risk Aversion Grouping	Group 5 - Do not know	34	20.6%	79.4%				12.512	3.339
	Group 4 - Most Risk Averse	75	25.3%	74.7%				13.284	3.898
	Group 3 - Risk Averse	68	35.3%	64.7%				13.636	3.840
	Group 2 - Medium Risk Averse	89	52.8%	47.2%	0.000	Yes	0.298	15.368	3.771
	Group 1 - Least Risk Averse	49	61.2%	38.8%				16.194	4.492
	Total	315	40.3%	59.7%				14.318	4.067
Background - Disposition of Trust Score	Mean or higher	167	42.5%	57.5%				14.374	4.220
	Below mean	148	37.8%	62.2%	0.422	No	0.048	14.255	3.900
	Total	315	40.3%	59.7%				14.318	4.067
Background - Sociability Score	Mean or higher	150	33.3%	66.7%				13.780	3.958
	Below mean	165	40.3%	59.7%	0.021	Yes	0.136	14.808	4.115
	Total	315	40.3%	59.7%				14.318	4.067
Background - Level of Optimism Score	Mean or higher	176	32.4%	67.6%				13.590	3.868
	Below mean	139	50.4%	49.6%	0.001	Yes	0.182	15.240	4.139
	Total	315	40.3%	59.7%				14.318	4.067
Background - Money preferences Score	Mean or higher	169	40.2%	59.8%				14.334	4.191
	Below mean	146	40.3%	59.7%	1.000	No	0.002	14.300	3.933
	Total	315	40.3%	59.7%				14.318	4.067
Total Objective Financial Knowledge - ADEQUACY	OK inadequate	153	22.0%	77.8%				12.555	3.505
	OK adequate	162	57.4%	42.6%	0.000	Yes	0.358	15.984	3.862
	Total	315	40.3%	59.7%				14.318	4.067

1) Scale from Min = 4.0 to Max = 26; Mid-Point = 15 indicates Neutral position

4.1.5.2 Self-Assessment of Financial Knowledge

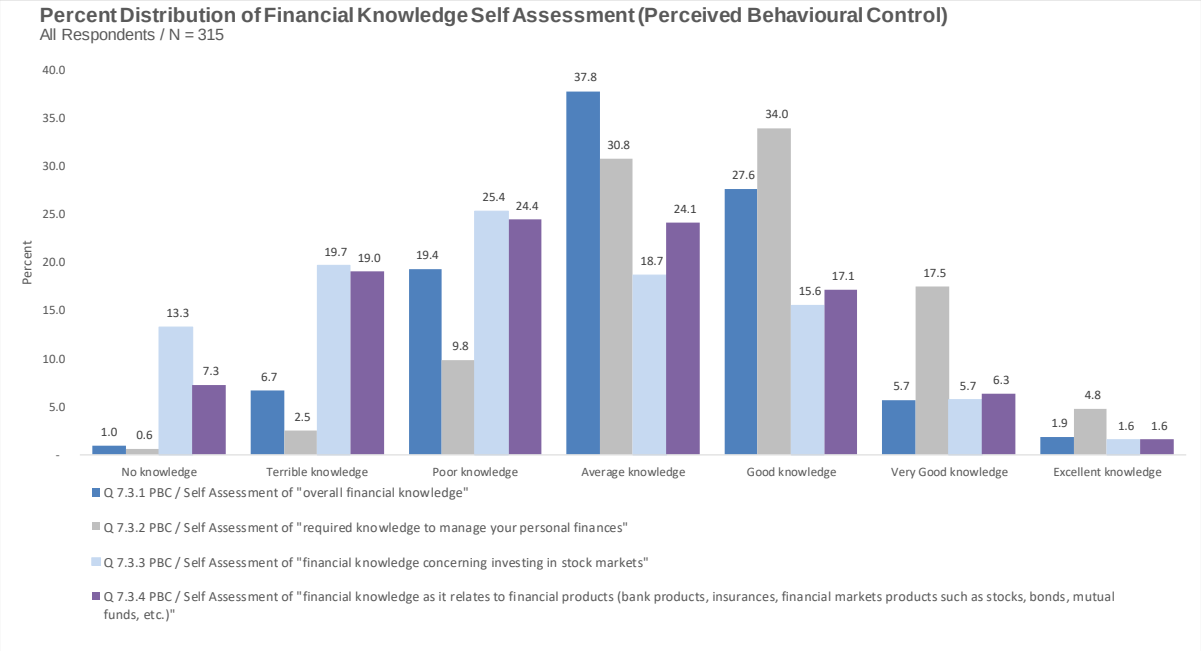
Self-assessment of financial knowledge comprises four items (see Q.7.3 in Appendix C as well as section 3.2.2.2.1) and was scored on a seven-point unipolar scale with a score of 7 indicating “excellent knowledge” and a score of 1 indicating “no knowledge”. Whereas students self-assessed their “overall financial knowledge” (Q:7.3.1) and the “required knowledge to manage personal finances” (Q.7.3.2) positively with a mean of 4.09 (mode of 4.00) and 4.66 (mode of 5.00), respectively, falling into the range of good to average knowledge, “financial knowledge concerning investing in stock markets” (Q.7.3.3) was self-assessed significantly lower with a mean of 3.27 (and a mode of 3.00), denoting approximately “poor knowledge”. Similarly, “financial knowledge as it relates to financial products” (Q.7.3.4) was self-assessed lower than overall financial knowledge with a mean of 3.50 (mode of 3.00).

Figure 30 – Descriptive Statistics – Self-Assessment of Financial Knowledge

Statistics

	N											
	Valid	Missing	Mean	Median	Mode	Std. Deviation	Skewness	Std. Error of Skewness	Kurtosis	Std. Error of Kurtosis	Minimum	Maximum
Q 7.3.1 PBC / Self Assessment of "overall financial knowledge"	315	0	4.09	4.00	4	1.103	-.054	.137	.233	.274	1	7
Q 7.3.2 PBC / Self Assessment of "required knowledge to manage your personal finances"	315	0	4.66	5.00	5	1.135	-.206	.137	.188	.274	1	7
Q 7.3.3 PBC / Self Assessment of "financial knowledge concerning investing in stock markets"	315	0	3.27	3.00	3	1.497	.270	.137	-.640	.274	1	7
Q 7.3.4 PBC / Self Assessment of "financial knowledge as it relates to financial products (bank products, insurances, financial markets products such as stocks, bonds, mutual funds, etc.)"	315	0	3.50	3.00	3	1.411	.165	.137	-.556	.274	1	7

Figure 31 – Frequency Distribution – Self-Assessment of Financial Knowledge



4.1.5.3 Indirect Measure of Perceived Behavioural Control (Control Beliefs)

The indirect measure of perceived behavioural control with specific relevance to SMP was assessed by agreement or disagreement with a belief statement comprising three items (see Q.7.2 in Appendix C as well as section 3.2.2.2.1) scored on a seven-point unipolar scale with a score of 7 indicating “strongly agree” and a score of 1 indicating “strongly disagree”.

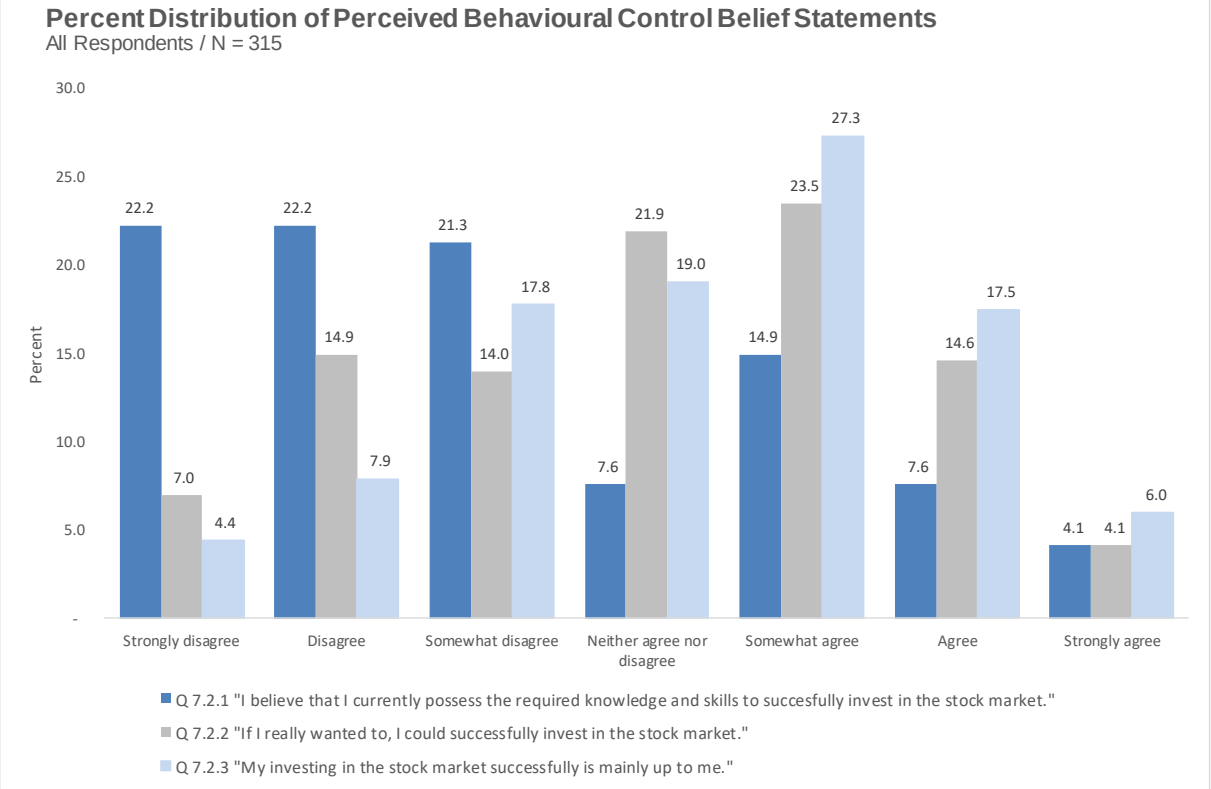
Most notably, the statement “I believe that I currently possess the required knowledge and skills to invest successfully in the stock market” (Q.7.2.1) scored a mean of 3.1, with 65.7% of respondents disagreeing (scores 1 “strongly disagree” to 3 “somewhat disagree”). In contrast, the control beliefs for the other two items (see Table 96) were recording as more neutral (Q.7.2.2 “If I really wanted to, I could successfully invest in the stock market”: mean = 4.00 and mode = 5.00) or slightly positive (Q.7.2.3 “My investing in the stock market successfully is mainly up to me”: mean = 4.33 and mode = 5.00) belief scores. The self-assessment of behavioural control regarding SMP, as measured directly by Q.7.3.3 and indirectly by Q.7.2.1, shows a high degree of correlation (Pearson’s r = 0.770, significant at the 0.01 level).

Table 96 – Descriptive Statistics – Indirect Measure of PBC (Control Beliefs)

Variable	N	Mean	Median	Mode	Attitude
Q 7.2.1 PBC / Control beliefs - Agreement to statement "I believe that I currently possess the required knowledge and skills to succesfully invest in the stock market."	315	3.10	3.00	1[a]	Disagree
Q 7.2.2 PBC / Control beliefs - Agreement to statement "If I really wanted to, I could successfully invest in the stock market."	315	4.00	4.00	5	Neutral
Q 7.2.3 PBC / Control beliefs - Agreement to statement "My investing in the stock market successfully is mainly up to me."	315	4.33	5.00	5	Agree

a. Multiple modes exist. The smallest value is shown

Figure 32 – Histogram – Frequency Distribution of Perceived Behavioural Control Belief Statements



4.1.5.4 Direct Measure of Perceived Behavioural Control

The direct measure of PBC is based on an assessment of the comfort level (three items on a seven-point unipolar scale with a score of 7 indicating “extremely comfortable” and a score of 1 indicating “extremely uncomfortable”) as well as the assessment of the certainty level of being able to manage SMP-related matters (two items on a five-point unipolar scale, with a score of 5 indicating “absolutely sure” and a score of 1 indicating “not at all sure”). Consistent with the tendency of the financial knowledge self-assessment, while the respondents are comfortable with “managing personal finances” (Q.7.4.1; mean = 5.16), they are equally uncomfortable about “investing in the stock market” (Q.7.4.2; mean = 3.26) or “choosing and buying financial products” (Q. 7.4.3; mean = 3.40). Similarly, the respondents overall display uncertainty concerning their ability to invest successfully (Q.7.5.2; mean = 2.52).

Table 97 - Descriptive Statistics – Direct Measure of PBC (Level of Certainty and Comfort)

Variable	N	Mean	Median	Mode	Attitude
Q 7.4.1 PBC / Comfort level to "manage your personal finances"	315	5.16	5.00	6	Comfortable
Q 7.4.2 PBC / Comfort level to "invest in the stock market"	315	3.26	3.00	3	Uncomfortable
Q 7.4.3 PBC / Comfort level to "choose and buy financial products (bank products, insurances, financial markets products such as stocks, bonds, mutual funds, etc.)"	315	3.40	3.00	2	Uncomfortable
Q 7.5.1 PBC / Level of Certainty that "success in investing in the stock market is in your control?"	315	2.85	3.00	3	Not Certain
Q 7.5.2 PBC / Level of Certainty that "you have the required ability to invest successfully in the stock market?"	315	2.52	2.00	2	Not Certain

Figure 33 – Histogram – Frequency Distribution of Comfort Level Assessment/PBC

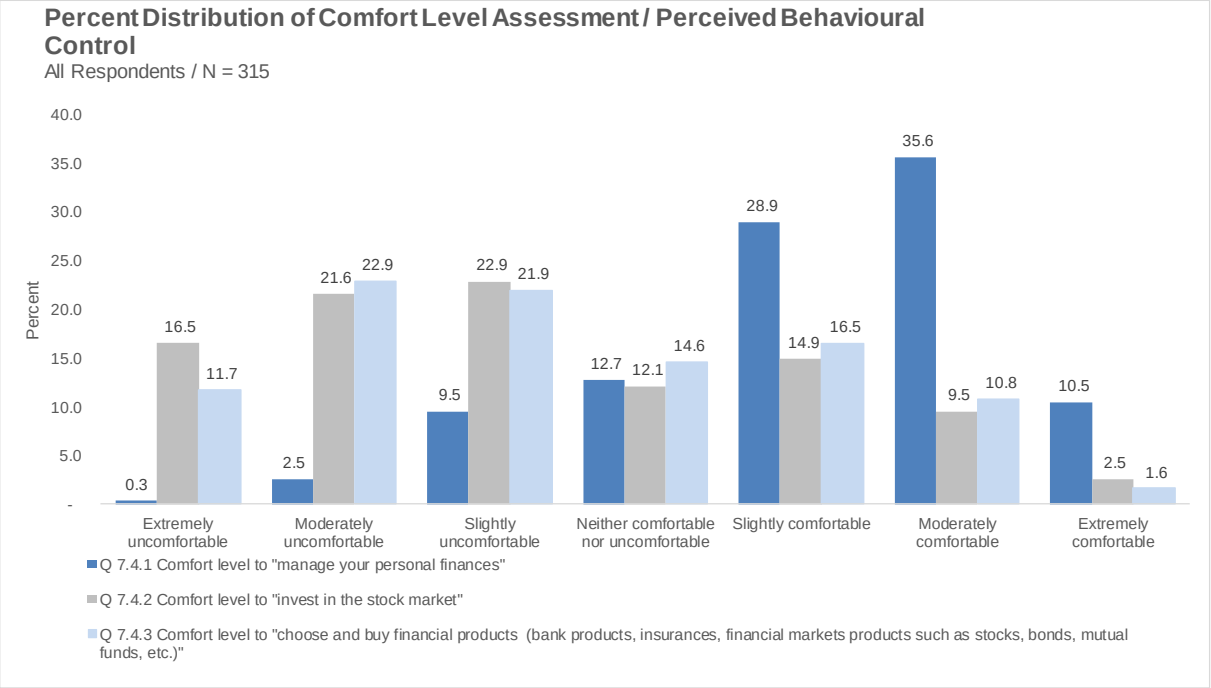
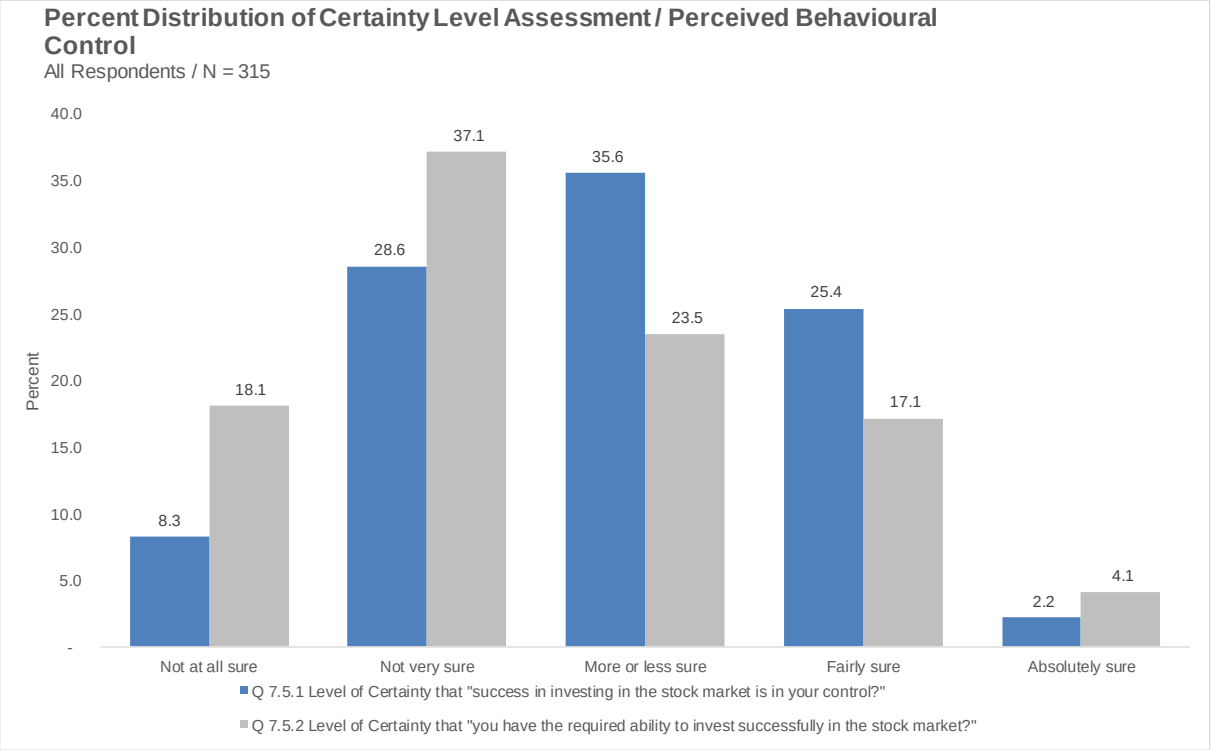


Figure 34 – Histogram – Frequency Distribution of Certainty Level Assessment/PBC



4.1.6 Actual Control

OK is defined as a proxy for AC in the RAA context, as outlined in section 3.2.2.2.2. In the following sections, the results of the OK assessment will be analysed in detail.

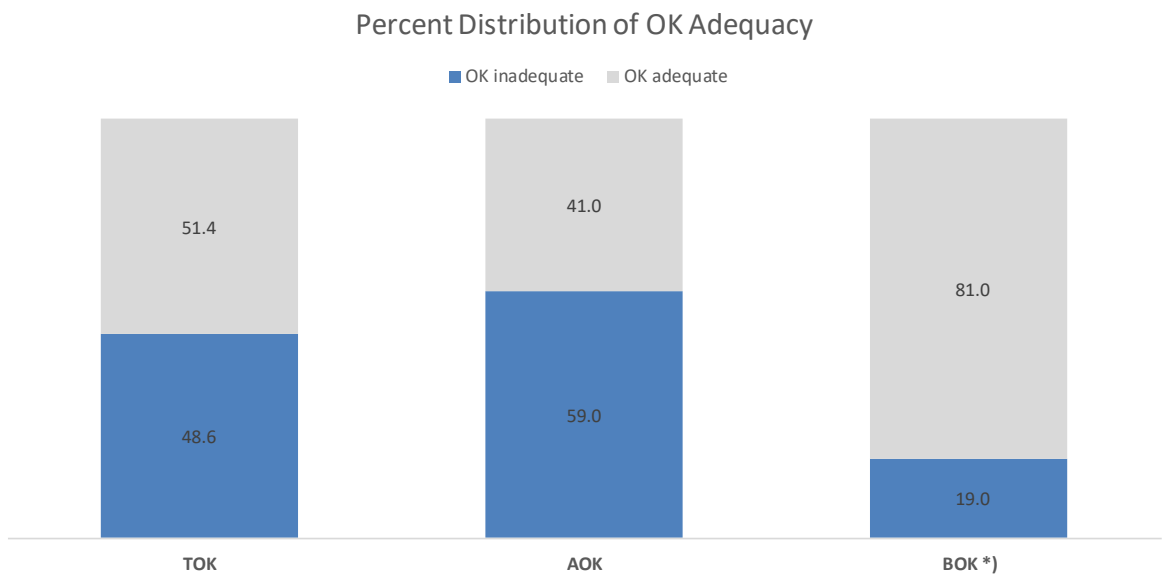
4.1.6.1 Overall Assessment of Objective Financial Knowledge (OK)

The results of the OK assessment vary sharply based on the different levels of OK. Whereas 81.0% of the respondents achieved an “adequate” BOK assessment (mean score = 3.6635 out of 5 relevant questions, indicating a mean of 73.27% of BOK questions answered correctly), only 41.0% of them achieved an “adequate” AOK assessment (mean score = 7.4190 out of 13 questions, indicating a mean of 57.1% of AOK questions answered correctly). In combination, this leads to an “adequate” TOK assessment for just over half the respondents (51.4%). Similarly, for reference, the OK-3 assessment achieved a mean score of 2.1524 from three relevant questions, indicating a mean of 71.7% of OK-3 questions answered correctly. Thus, the BOK and the OK-3 set of questions achieved similar results for assessing basic OK. Consequently, for further analysis, only the BOK set of questions will be considered as a proxy for basic OK.

Table 98 - Descriptive Statistics – Objective Financial Knowledge (Actual Control)

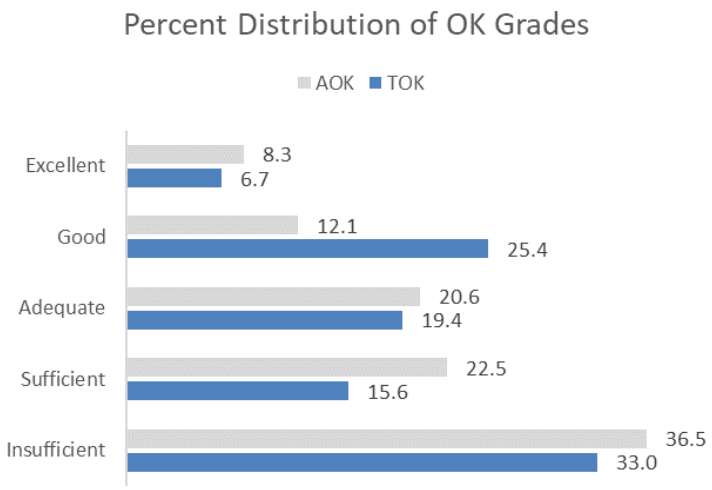
		TOK - SCORE	TOK - GRADES	TOK - ADEQUACY	OK-3 SCORE	BOK - SCORE	AOK - SCORE	AOK - GRADES	AOK - ADEQUACY
N		315	315	315	315	315	315	315	315
Mean		11.0825	2.5714	0.5143	2.1524	3.6635	7.4190	2.3302	0.4095
Median		12.0000	3.0000	1.0000	2.0000	4.0000	8.0000	2.0000	0.0000
Mode		13.00	1.00	1.00	3.00	4.00	8.00	1.00	0.00
Std. Deviation		4.15536	1.34868	0.50059	0.92503	1.37809	3.21456	1.30123	0.49253
Percentiles	25	8.0000	1.0000	0.0000	1.0000	3.0000	5.0000	1.0000	0.0000
	50	12.0000	3.0000	1.0000	2.0000	4.0000	8.0000	2.0000	0.0000
	75	14.0000	4.0000	1.0000	3.0000	5.0000	10.0000	3.0000	1.0000

Figure 35 – Actual Control – Percentage Distribution of OK Adequacy



**) Score of 0 - 2 deemed inadequate and a score of 3 - 5 adequate*

Figure 36 – Actual Control – Percentage Distribution of OK Grades



4.1.6.2 Sub-sample Exploratory Data Analysis

The literature (see sections 2.4.4.3 and 2.5.2) suggests that correlations between OK and certain background factors exist. Consequently, the results of an exploratory data analysis based on relevant background factors' (see section 4.1.2) association with TOK and AOK are reported in Table 99 below. The strongest association between AOK adequacy and TOK adequacy, respectively, was recorded with the respondent's FK self-assessment of relevant SMP knowledge (Φ_C = 0.398 with TOK and Φ_C = 0.373 with AOK) as well as their comfort level with SMP (Φ_C = 0.350 with TOK and Φ_C = 0.333 with AOK), indicating that overall the respondents have a reasonably realistic evaluation of their own knowledge level. The factor "practical SMP experience" similarly recorded a strong association (Φ_C = 0.356 with TOK and Φ_C = 0.346 with AOK), indicating that the respondents with practical SMP experience achieved a significantly higher level of OK adequacy (78.7% of TOK adequacy) than those respondents without relevant experience (39.8% of TOK adequacy).

Similarly, business students exhibit a higher level of OK adequacy than non-business students, with the correlation being more pronounced for AOK adequacy (56.8% AOK adequacy of business students versus 30.3% AOK adequacy of non-business students). Given the study subject matter and expected corresponding intrinsic interest, this relationship was expected and is documented in prior FL research (see section 2.5.3.2). Nevertheless, there is no statistically significant correlation between "study subject" and "practical SMP experience", indicating that business students are not more likely to possess SMP experience than non-business students.

A further significant association that is well documented in the previous literature (see sections 2.4.4.2 and 2.5.3.1) is the gender gap. Similarly, in this study, male respondents exhibit on average a noticeably higher level of AOK and TOK adequacy. This correlation remains statistically significant (r = -0.123 at a two-tailed significance level of p = 0.029), even at the BOK level.

A further factor associated with OK adequacy appears to be the education level of the parents (legal guardians), with respondents who indicated that they have a parent (legal guardian) responsible for family money management matters who possesses an academic degree exhibiting a higher level of AOK and TOK adequacy. This association confirms prior findings documented in the literature (see section 2.5.3.4).

The factor "nationality" recorded a significantly higher level of AOK and TOK for German respondents than for international students. This relationship remains statistically significant (0.01 level two-tailed) at the BOK level, with international students recording a BOK adequacy rate of 59.2% compared with 85.0% for German students. This result might be explained

partially by the language barrier and survey understanding problems as international students might have answered the questionnaire (available in the English and German languages) in a non-native language.

Considering the character-based background variables, only “level of optimism” established a significant association with OK adequacy, resulting in respondents exhibiting a below-mean optimism score registering a higher TOK and AOK adequacy level. In the following section, the OK assessment results are evaluated on an item-by-item basis.

Table 99 – Objective Financial Knowledge Sub-sample Data Exploration

Factor	Categories	N	Total Objective Financial Knowledge Adequacy					Advanced Objective Financial Knowledge Adequacy				
			Adequate	Inadequate	Pearson Chi-Square test	Association statistically significant?	Cramer's V	Adequate	Inadequate	Pearson Chi-Square test	Association statistically significant?	Cramer's V
Nationality	International	49	24.5%	75.5%				20.4%	79.6%			
	Germany	266	56.4%	43.6%	0.000	Yes	0.231	44.7%	55.3%	0.001	Yes	0.179
	Total	315	51.4%	48.6%				41.0%	59.0%			
Sex	Male	171	64.9%	35.1%				51.5%	48.5%			
	Female	144	35.4%	64.6%	0.000	Yes	0.294	28.5%	71.5%	0.000	Yes	0.233
	Total	315	51.4%	48.6%				41.0%	59.0%			
Study Subject	Non-Business Student	190	44.2%	55.8%				30.5%	69.5%			
	Business Student	125	62.4%	37.6%	0.002	Yes	0.178	56.8%	43.3%	0.000	Yes	0.261
	Total	315	51.4%	48.6%				41.0%	59.0%			
Personal Finance Education received prior to university studies	No	225	48.0%	52.0%				36.4%	63.6%			
	Yes	90	60.0%	40.0%	0.062	No	0.108	52.2%	47.8%	0.011	Yes	0.145
	Total	315	51.4%	48.6%				41.0%	59.0%			
Background - Education Legal Guardian	Not Applicable	7	14.3%	85.7%				0.0%	100.0%			
	Non-Academic	165	44.2%	55.8%	0.001	Yes	0.204	32.1%	67.9%	0.000	Yes	0.245
	Academic	143	61.5%	38.5%				53.1%	46.9%			
	Total	315	51.4%	48.6%				41.0%	59.0%			
Practical Experience SMP	No	221	39.8%	60.2%				29.9%	70.1%			
	Yes	94	78.7%	21.3%	0.000	Yes	0.356	67.0%	33.0%	0.000	Yes	0.346
	Total	315	51.4%	48.6%				41.0%	59.0%			
Risk Aversion (based on Q.6.1)	No or Do not Know	177	45.8%	54.2%				35.6%	64.4%			
	Yes	138	58.7%	41.3%	0.024	Yes	0.128	47.8%	52.2%	0.037	Yes	0.123
	Total	315	51.4%	48.6%				41.0%	59.0%			
Risk Aversion Grouping	Group 5 - Do not know	34	38.2%	61.8%				26.5%	73.5%			
	Group 4 - Most Risk Averse	75	46.7%	53.3%				33.3%	66.7%			
	Group 3 - Risk Averse	68	48.5%	51.5%				42.6%	57.4%			
	Group 2 - Medium Risk Averse	89	60.7%	39.3%	0.161	No	0.145	50.6%	49.4%	0.081	No	0.162
	Group 1 - Least Risk Averse	49	55.1%	44.9%				42.9%	57.1%			
	Total	315	51.4%	48.6%				41.0%	59.0%			
Background - Disposition of Trust Score	Mean or higher	167	55.7%	44.3%				46.7%	53.3%			
	Below mean	148	46.6%	53.4%	0.115	No	0.091	34.5%	65.6%	0.030	Yes	0.124
	Total	315	51.4%	48.6%				41.0%	59.0%			
Background - Sociability Score	Mean or higher	150	51.3%	48.7%				37.3%	62.7%			
	Below mean	165	51.5%	48.5%	1.000	No	0.002	44.2%	55.8%	0.251	No	0.070
	Total	315	51.4%	48.6%				41.0%	59.0%			
Background - Level of Optimism Score	Mean or higher	176	43.8%	56.3%				33.5%	66.5%			
	Below mean	139	61.2%	38.8%	0.002	Yes	0.173	54.3%	37.1%	0.003	Yes	0.170
	Total	315	51.4%	48.6%				41.0%	59.0%			
Background - Money preferences Score	Mean or higher	169	52.1%	47.9%				42.0%	58.0%			
	Below mean	146	50.7%	49.3%	0.822	No	0.014	39.7%	60.3%	0.731	No	0.023
	Total	315	51.4%	48.6%				41.0%	59.0%			
Self-Assessment "Required Knowledge to invest in Stock Market" (Q.7.3.3)	Below average	184	35.3%	64.7%				26.6%	73.4%			
	Average	59	64.4%	35.6%	0.000	Yes	0.398	49.2%	50.8%	0.000	Yes	0.373
	Above average	72	81.9%	18.1%				70.8%	29.2%			
	Total	315	51.4%	48.6%				41.0%	59.0%			
Comfort Level to "invest in the stock market" (Q.7.4.2)	Uncomfortable	192	38.5%	61.5%				29.2%	70.8%			
	Neither comfortable nor uncomfortable	38	55.3%	44.7%	0.000	Yes	0.350	42.1%	57.9%	0.000	Yes	0.333
	Comfortable	85	78.8%	21.2%				67.1%	32.9%			
	Total	315	51.4%	48.6%				41.0%	59.0%			

4.1.6.3 Analysis by Individual Items

This section evaluates the salient findings of the OK assessment responses on a question-by-question basis. The detailed questions and answer options are detailed in Appendix C. Table 100 outlines the percentages of correct, incorrect, and "do not know/do not want to answer" replies recorded for all the respondents (N = 315), contrasted with the results reported by van Rooij et al. (2011b) for items 1 through 16. It is noticeable that the current research overall achieved results that are not too dissimilar from the data set (N = 1,508) utilised by van Rooij et al., which is representative of the Dutch population. Table 101 and Table 102 detail the percentage of correct answers based on the relevant sub-sample categories identified in the previous section. One explanation put forward for the SMPP (see section 2.4.5) is that, if individuals believe that the stock market does not yield an expected return in excess of the risk-free rate, they will choose to stay out of the market (Guiso & Sodini, 2012). Consequently, it is noticeable that, while a majority of the respondents correctly assessed stocks as the most risky investment form (Q.13.12: 80.0% correct answers; see Table 100), fewer than half of the respondents (Q.13.11: 45.7% correct answers; see Table 100) also identified the long-term superior return potential of stocks. However, this result is very similar to that of van Rooij et al. (2011b), reporting 47.1% correct answers to Q.13.11 and 68.5% correct answers to Q.13.12. The difference in correct answers to those items becomes significantly more pronounced when looking at the sub-samples in Table 102: only 35.4% of female respondents replied correctly to Q.13.11 (asset return expectations), but 75.7% of female respondents correctly identified the risk expectation of stocks (Q.13.12). Even for respondents who achieved an adequate TOK rating, 63.0% identified stocks as the asset class with the highest return expectation compared with 94.4% who correctly identified the risk characteristics. It is evident that, while German respondents achieved a higher correct answer rate for all the other questions, Q.13.11 is the only question for which international students gave more correct answers. This observation aligns with Erner et al. (2016), who find that German high-school students have a persistently wrong perception of the risk–return profile of stock investments and might also be indicative of the comparatively low SMP rate in Germany.

Table 100 – OK Assessment by Individual Items

			Present Research (N = 315)			***van Rooij et al (2011)*** *(N = 1'508)*		
Instrument No.	**Survey Question No.**	**Underlying Finance Concept**	**Correct**	**Incorrect**	**Do not Know / do not want to answer**	***Correct***	***Incorrect***	***Do not Know***
Basic OK Questions								
1	Q.13.2	Numeracy	**90.8%**	**4.1%**	**5.1%**	*90.8%*	*5.2%*	*3.7%*
2	Q.13.3	Interest Compounding	**74.3%**	**18.1%**	**7.6%**	*76.2%*	*19.6%*	*3.8%*
3	Q.13.4	Inflation	**70.8%**	**8.9%**	**20.3%**	*82.6%*	*8.6%*	*8.5%*
4	Q.13.5	Time Value of Money	**55.6%**	**31.1%**	**13.3%**	*72.3%*	*23.0%*	*4.3%*
5	Q.13.6	Money Illusion	**74.9%**	**15.3%**	**9.8%**	*71.8%*	*24.3%*	*3.5%*
Advanced OK Questions								
6	Q.13.7	Stock Market	**60.3%**	**21.6%**	**18.1%**	*67.0%*	*12.9%*	*19.7%*
7	Q.13.8	Stocks	**82.9%**	**9.2%**	**7.9%**	*62.2%*	*25.6%*	*11.0%*
8	Q.13.9	Mutual Funds I	**49.2%**	**10.2%**	**40.6%**	*66.7%*	*11.2%*	*21.7%*
9	Q.13.10	Bonds I	**53.7%**	**17.4%**	**28.9%**	*55.5%*	*17.7%*	*26.4%*
10	Q.13.11	Asset Return Expectations	**45.7%**	**28.0%**	**26.3%**	*47.2%*	*30.1%*	*22.3%*
11	Q.13.12	Asset Risk Expectations	**80.0%**	**7.9%**	**12.1%**	*68.5%*	*12.7%*	*18.4%*
12	Q.13.13	Diversification	**85.1%**	**4.7%**	**10.2%**	*63.3%*	*17.4%*	*19.0%*
13	Q.13.14	Bonds II	**26.0%**	**29.9%**	**44.1%**	*30.0%*	*28.3%*	*37.9%*
14	Q.13.15	Risk of stocks vs. bonds	**50.8%**	**15.5%**	**33.7%**	*60.2%*	*15.1%*	*24.3%*
15	Q.13.16	Stocks vs. Mutual Funds	**53.7%**	**9.2%**	**37.1%**	*48.2%*	*24.8%*	*26.6%*
16	Q.13.17	Bond prices	**19.7%**	**36.8%**	**43.5%**	*24.6%*	*37.1%*	*37.5%*
17	Q.13.18	Mutual Funds II	**66.7%**	**7.0%**	**26.3%**	*N/A*	*N/A*	*N/A*
18	Q.13.19	Mutual Funds III	**68.3%**	**8.2%**	**23.5%**	*N/A*	*N/A*	*N/A*

Table 101 – BOK Assessment – Percentage of Correct Answers by Sub-sample Categories

Factor	Categories	N	Basic Objective Financial Knowledge Questions				
			Q.13.2	Q.13.3	Q.13.4	Q.13.5	Q.13.6
Nationality	International	49	85.7%	55.1%	40.8%	42.9%	65.3%
	Germany	266	91.7%	77.8%	76.3%	57.9%	76.7%
	Total	315	90.8%	74.3%	70.8%	55.6%	74.9%
Sex	Male	171	94.2%	81.3%	79.5%	57.3%	75.4%
	Female	144	86.8%	66.0%	60.4%	53.5%	74.3%
	Total	315	90.8%	74.3%	70.8%	55.6%	74.9%
Study Subject	Non-Business Student	190	88.4%	70.0%	67.9%	52.1%	73.7%
	Business Student	125	94.4%	80.8%	75.2%	60.8%	76.8%
	Total	315	90.8%	74.3%	70.8%	55.6%	74.9%
Personal Finance Education received prior to university studies	No	225	91.6%	74.7%	71.6%	53.8%	73.3%
	Yes	90	88.9%	73.3%	68.9%	60.0%	78.9%
	Total	315	90.8%	74.3%	70.8%	55.6%	74.9%
Background - Education Legal Guardian	Not Applicable	7	85.7%	71.4%	71.4%	28.6%	85.7%
	Non-Academic	165	87.3%	69.1%	64.2%	50.3%	68.5%
	Academic	143	95.1%	80.4%	78.3%	62.9%	81.8%
	Total	315	90.8%	74.3%	70.8%	55.6%	74.9%
Practical Experience SMP	No	221	89.1%	67.9%	63.4%	52.0%	72.9%
	Yes	94	94.7%	89.4%	88.3%	63.8%	79.8%
	Total	315	90.8%	74.3%	70.8%	55.6%	74.9%
Risk Aversion (based on Q.6.1)	No or Do not Know	177	88.7%	71.2%	70.1%	55.4%	75.7%
	Yes	138	93.5%	78.3%	71.7%	55.8%	73.9%
	Total	315	90.8%	74.3%	70.8%	55.6%	74.9%
Background - Level of Optimism Score	Mean or higher	176	88.1%	69.9%	65.9%	48.9%	69.3%
	Below mean	139	64.2%	79.9%	77.0%	64.0%	82.0%
	Total	315	90.8%	74.3%	70.8%	55.6%	74.9%
Perceived Behavioural Control Score (Dichotomous)	Neutral or Negative	188	89.4%	68.6%	63.8%	55.9%	74.5%
	Positive	127	92.9%	82.7%	81.1%	55.1%	75.6%
	Total	315	90.8%	74.3%	70.8%	55.6%	74.9%
Total Objective Financial Knowledge	OK Inadequate	153	82.4%	54.9%	44.4%	38.6%	60.1%
	OK Adequate	162	98.8%	92.6%	95.7%	71.6%	88.9%
	Total	315	90.8%	74.3%	70.8%	55.6%	74.9%
Self-Assessment "Required Knowledge to invest in Stock Market" (Q.7.3.3)	Below average	184	89.1%	66.3%	63.6%	51.6%	72.8%
	Average	59	93.2%	86.4%	71.2%	62.7%	81.4%
	Above average	72	93.1%	84.7%	88.9%	59.7%	75.0%
	Total	315	90.8%	74.3%	70.8%	55.6%	74.9%
Comfort Level to "invest in the stock market" (Q.7.4.2)	Uncomfortable	192	89.6%	70.8%	65.1%	52.6%	76.6%
	Neither comfortable nor uncomfortable	38	84.2%	68.4%	65.8%	57.9%	60.5%
	Comfortable	85	96.5%	84.7%	85.9%	61.2%	77.7%
	Total	315	90.8%	74.3%	70.8%	55.6%	74.9%

Table 102 – AOK Assessment – Percentage of Correct Answers by Sub-sample Categories

Factor	Categories	N	Advanced Objective Financial Knowledge Questions											
			Q.13.7	Q.13.8	Q.13.9	Q.13.10	Q.13.11	Q.13.12	Q.13.13	Q.13.14	Q.13.15	Q.13.16	Q.13.17	Q.13.18	Q.13.19
Nationality	International	49	46.9%	67.4%	28.6%	42.9%	46.9%	61.2%	71.4%	26.5%	44.9%	40.8%	16.3%	55.1%	59.2%
	Germany	266	62.8%	85.7%	53.0%	55.6%	45.5%	83.5%	87.6%	25.9%	51.9%	56.0%	20.3%	68.8%	69.9%
	Total	315	60.3%	82.9%	49.2%	53.7%	45.7%	80.0%	85.1%	26.0%	50.8%	53.7%	19.7%	66.7%	68.3%
Sex	Male	171	67.3%	87.1%	57.3%	59.7%	54.4%	83.6%	87.7%	32.2%	57.3%	59.7%	20.5%	75.9%	76.0%
	Female	144	52.1%	77.8%	39.6%	46.5%	35.4%	75.7%	81.9%	18.8%	43.1%	46.5%	18.8%	56.9%	59.0%
	Total	315	60.3%	82.9%	49.2%	53.7%	45.7%	80.0%	85.1%	26.0%	50.8%	53.7%	19.7%	66.7%	68.3%
Study Subject	Non-Business Student	190	53.7%	80.5%	44.7%	45.8%	41.1%	77.9%	79.5%	21.1%	42.1%	44.7%	13.2%	61.1%	64.2%
	Business Student	125	70.4%	86.4%	56.0%	65.6%	52.8%	83.2%	93..6%	33.6%	64.0%	67.2%	29.6%	75.2%	74.4%
	Total	315	60.3%	82.9%	49.2%	53.7%	45.7%	80.0%	85.1%	26.0%	50.8%	53.7%	19.7%	66.7%	68.3%
Personal Finance Education received prior to university studies	No	225	59.1%	84.9%	46.2%	51.6%	45.8%	82.2%	83.6%	23.6%	50.7%	48.4%	17.3%	64.9%	66.7%
	Yes	90	63.3%	77.8%	56.7%	58.9%	45.6%	74.4%	88.9%	32.2%	51.1%	66.7%	25.6%	71.1%	72.2%
	Total	315	60.3%	82.9%	49.2%	53.7%	45.7%	80.0%	85.1%	26.0%	50.8%	53.7%	19.7%	66.7%	68.3%
Background - Education Legal Guardian	Not Applicable	7	28.6%	85.7%	71.4%	28.6%	42.9%	57.1%	100.0%	28.6%	42.9%	57.1%	14.3%	71.4%	42.9%
	Non-Academic	165	55.2%	79.4%	40.0%	50.9%	43.6%	77.6%	82.4%	22.4%	49.7%	43.6%	15.2%	61.8%	66.1%
	Academic	143	67.8%	86.7%	58.7%	58.0%	48.3%	83.9%	87.4%	30.1%	52.5%	65.0%	25.2%	72.0%	72.0%
	Total	315	60.3%	82.9%	49.2%	53.7%	45.7%	80.0%	85.1%	26.0%	50.8%	53.7%	19.7%	66.7%	68.3%
Practical Experience SMP	No	221	55.7%	80.5%	37.1%	47.1%	38.5%	76.9%	81.9%	24.4%	46.2%	41.6%	17.7%	59.3%	60.6%
	Yes	94	71.3%	88.3%	77.7%	69.2%	62.8%	87.2%	92.6%	29.8%	61.7%	81.9%	24.5%	84.0%	86.2%
	Total	315	60.3%	82.9%	49.2%	53.7%	45.7%	80.0%	85.1%	26.0%	50.8%	53.7%	19.7%	66.7%	68.3%
Risk Aversion (based on Q.6.1)	No or Do not Know	177	59.9%	80.8%	42.9%	50.9%	42.4%	79.7%	83.6%	25.4%	50.9%	48.6%	15.8%	63.3%	63.3%
	Yes	138	60.9%	85.5%	57.3%	57.3%	50.0%	80.4%	87.0%	26.8%	50.7%	60.1%	24.6%	71.0%	74.6%
	Total	315	60.3%	82.9%	49.2%	53.7%	45.7%	80.0%	85.1%	26.0%	50.8%	53.7%	19.7%	66.7%	68.3%
Background - Level of Optimism Score	Mean or higher	176	56.3%	79.6%	42.6%	47.7%	41.5%	79.6%	80.1%	17.1%	46.6%	47.7%	16.5%	61.4%	67.1%
	Below mean	139	65.5%	87.1%	57.6%	61.2%	51.1%	80.6%	91.4%	37.4%	56.1%	61.2%	23.7%	73.4%	69.8%
	Total	315	60.3%	82.9%	49.2%	53.7%	45.7%	80.0%	85.1%	26.0%	50.8%	53.7%	19.7%	66.7%	68.3%
Perceived Behavioural Control Score (Dichotomous)	Neutral or Negative	188	53.2%	81.4%	37.8%	45.2%	37.2%	78.2%	81.4%	18.6%	44.7%	43.1%	14.9%	60.1%	60.1%
	Positive	127	70.9%	85.0%	66.1%	66.1%	58.3%	82.7%	90.6%	37.0%	59.8%	69.3%	26.8%	76.4%	80.3%
	Total	315	60.3%	82.9%	49.2%	53.7%	45.7%	80.0%	85.1%	26.0%	50.8%	53.7%	19.7%	66.7%	68.3%
Total Objective Financial Knowledge	OK Inadequate	153	37.3%	68.0%	22.2%	29.4%	27.5%	64.7%	69.9%	11.8%	28.1%	28.1%	5.2%	39.9%	45.8%
	OK Adequate	162	82.1%	96.9%	74.7%	76.5%	63.0%	94.4%	99.4%	39.5%	72.2%	77.8%	33.3%	92.0%	89.5%
	Total	315	60.3%	82.9%	49.2%	53.7%	45.7%	80.0%	85.1%	26.0%	50.8%	53.7%	19.7%	66.7%	68.3%
Self-Assessment "Required Knowledge to invest in Stock Market" (Q.7.3.3)	Below average	184	53.3%	82.6%	36.4%	44.0%	36.4%	77.2%	79.9%	20.1%	41.9%	41.3%	12.0%	59.8%	59.8%
	Average	59	61.0%	83.1%	61.0%	54.2%	45.8%	83.1%	93.2%	27.1%	64.4%	66.1%	25.4%	72.9%	74.6%
	Above average	72	77.8%	83.3%	72.2%	77.8%	69.4%	84.7%	91.7%	40.3%	62.5%	75.0%	34.7%	79.2%	84.7%
	Total	315	60.3%	82.9%	49.2%	53.7%	45.7%	80.0%	85.1%	26.0%	50.8%	53.7%	19.7%	66.7%	68.3%
Comfort Level to "invest in the stock market" (Q.7.4.2)	Uncomfortable	192	56.3%	81.8%	41.2%	45.8%	37.5%	77.1%	81.8%	20.3%	44.3%	44.8%	14.1%	60.4%	63.0%
	Neither comfortable nor uncomfortable	38	50.0%	79.0%	39.5%	55.3%	47.4%	79.0%	84.2%	26.3%	50.0%	52.6%	15.8%	68.4%	60.5%
	Comfortable	85	74.1%	87.1%	71.8%	70.6%	63.5%	87.1%	92.9%	38.8%	65.9%	74.1%	34.1%	80.0%	83.5%
	Total	315	60.3%	82.9%	49.2%	53.7%	45.7%	80.0%	85.1%	26.0%	50.8%	53.7%	19.7%	66.7%	68.3%

4.1.7 Behavioural Intention

As detailed in section 3.2.2.3, the dependent variable *behavioural intention* (BI) was measured by three intermittently placed items (see Q.4, Q.8, and Q.14 in Appendix C) on a bipolar seven-point scale (+3 indicating strong intention to perform the behaviour and -3 indicating strong intention not to perform the behaviour). The wording of the items differs based on whether the respondent indicated that he/she is currently invested in stocks (Q.4.1). Based on these three individual measures, a "behavioural intention" composite score was calculated as the simple average of the individual scores. The individual scores show a high degree of correlation with the composite score (Pearson's r between 0.905 and 0.938; correlations are significant at the $p < 0.001$ level); thus, the composite score is considered to be an acceptable overall proxy for BI. Overall, the composite score indicates a moderate degree of intention to participate in the stock market (mean = +1.11, median = + 1.33).

Table 103 - Descriptive Statistics – Behavioural Intention (BI)

	N	Mean	Median	Mode	Std. Deviation	Skewness	Std. Error of Skewness	Kurtosis	Std. Error of Kurtosis	Minimum	Maximum
Score - Intention to Behaviour - Intermittent I (Q.4) BIPOLAR	315	1.1556	2.0000	3.00	1.78045	-0.860	0.137	-0.265	0.274	-3.00	3.00
Score - Intention to Behaviour - Intermittent II (Q.8) BIPOLAR	315	1.0254	1.0000	1.00	1.75561	-0.760	0.137	-0.412	0.274	-3.00	3.00
Score - Intention to Behaviour - Intermittent III (Q.14) BIPOLAR	315	1.1365	1.0000	1.00	1.72203	-0.876	0.137	-0.110	0.274	-3.00	3.00
Score - Intention to Behaviour - Composite	315	1.1058	1.3333	3.00	1.61844	-0.776	0.137	-0.267	0.274	-3.00	3.00

For the purpose of analysing the potential association of salient background factors, the composite BI score was recoded into a dichotomous variable ("SCO_Intention_Dichotomous") based on whether the score indicated a positive (score greater 0) or neutral or, respectively, negative (score of 0 or lower) attitude. The Pearson chi-square test was conducted to establish a statistically significant association, and Cramer's V was used to evaluate the strength of the association. Significant associations were identified for the factors "practical SMP experience" ($\Phi_C = 0.323$), "personal finance education" ($\Phi_C = 0.229$), "study subject" ($\Phi_C = 0.159$), and "TOK adequacy" ($\Phi C = 0.349$), suggesting that practical and/or theoretical experience and exposure to financial topics are associated with a more positive BI. Also noticeable is the strong association of "sex" ($\Phi_C = 0.190$), with female respondents self-assessing their BI significantly more negatively than male respondents. "Risk aversion" ($\Phi_C = 0.145$) also registered significant associations.

Figure 37 – Composite BI Score (Dichotomous) by Background Factor

Factor	Categories	N	Composite Intention to Behaviour Score Dichotomous ("SCO_INTENTION_DICHOTOMOUS")				
			Positive (Score > 0)	Neutral or Negative (Score <= 0)	Pearson Chi-Square test	Association statistically significant?	Cramer's V
Nationality	International	49	63.3%	36.7%	0.029	Yes	0.123
	Germany	266	77.8%	22.2%			
	Total	315	75.6%	24.4%			
Sex	Male	171	83.0%	17.0%	0.001	Yes	0.190
	Female	144	66.7%	33.3%			
	Total	315	75.6%	24.4%			
Study Subject	Non-Business Student	190	70.0%	30.0%	0.005	Yes	0.159
	Business Student	125	84.0%	16.0%			
	Total	315	75.6%	24.4%			
Personal Finance Education received prior to university studies	No	225	69.3%	30.7%	0.000	Yes	0.229
	Yes	90	91.1%	8.9%			
	Total	315	75.6%	24.4%			
Background - Education Legal Guardian	Not Applicable	7	57.1%	42.9%	0.124	No	0.115
	Non-Academic	165	72.1%	27.9%			
	Academic	143	80.4%	19.6%			
	Total	315	75.6%	24.4%			
Practical Experience SMP	No	221	66.5%	33.5%	0.000	Yes	0.323
	Yes	94	96.8%	3.2%			
	Total	315	75.6%	24.4%			
Risk Aversion (based on Q.6.1)	No or Do not Know	177	70.1%	29.9%	0.010	Yes	0.145
	Yes	138	82.6%	17.4%			
	Total	315	75.6%	24.4%			
Risk Aversion Grouping	Group 5 - Do not know	34	82.4%	17.6%	0.001	Yes	0.241
	Group 4 - Most Risk Averse	75	57.3%	42.7%			
	Group 3 - Risk Averse	68	77.9%	22.1%			
	Group 2 - Medium Risk Averse	89	82.0%	18.0%			
	Group 1 - Least Risk Averse	49	83.7%	16.3%			
	Total	315	75.6%	24.4%			
Background - Disposition of Trust Score	Mean or higher	167	76.6%	23.4%	0.632	No	0.027
	Below mean	148	74.3%	25.7%			
	Total	315	75.6%	24.4%			
Background - Sociability Score	Mean or higher	150	74.4%	25.3%	0.726	No	0.020
	Below mean	165	76.4%	23.6%			
	Total	315	75.6%	24.4%			
Background - Level of Optimism Score	Mean or higher	176	70.5%	29.5%	0.018	Yes	0.134
	Below mean	139	82.0%	18.0%			
	Total	315	75.6%	24.4%			
Background - Money preferences Score	Mean or higher	169	74.6%	25.4%	0.657	No	0.025
	Below mean	146	76.7%	23.3%			
	Total	315	75.6%	24.4%			
Total Objective Financial Knowledge - ADEQUACY	OK inadequate	153	60.1%	39.9%	0.000	Yes	0.349
	OK adequate	162	90.1%	9.9%			
	Total	315	75.6%	24.4%			

**) Q.6.1 recoded do a dichotomous variable by grouping "No" and "Do not know" responses together*

4.1.8 Summary

Based on the descriptive analysis in the preceding sections, it is possible to conclude that, considering the composite scores, the predictor variables FA and PSN appear to have a positive mean position whereas PBC indicates an overall slightly negative assessment by the respondents of their own financial knowledge. The AC/OK assessment suggests an adequate level of BOK (81.0% adequate), whereas only 41.0% of respondents achieved an "adequate" AOK assessment. In combination, this leads to an "adequate" TOK assessment for just over half of the respondents. The data exploration is summarised in Table 105, applying the criterion of Cramer's V effect sizes outlined in Table 104. Based on the analysis in the preceding sections, the socio-demographic variables "sex" and "practical SMP experience" as well as the character-based variables "practical SMP experience" and "TOK" were also expected to be relevant in the multivariate analysis.

Table 104 – Cramer's V Effect Sizes

Degrees of Freedom	Small Effect	Medium Effect	Large Effect
for df = 1	0.100	0.300	0.500
for df = 2	0.070	0.210	0.350
for df = 3	0.060	0.170	0.290

Source: based on Cohen, 1988, cited in Gravetter & Wallnau, 2017

Table 105 – Summary Descriptive Statistical Analysis

Variable Scores	Indication	Background Variable Associations[1)]												
		Nationality	*Sex*	*Study Subject*	*Personal Finance Education*	*Education Legal Guardian*	*Practical Experience SMP*	*Risk Aversion*	*Risk Aversion Grouping*	*Disposition to Trust*	*Sociability*	*Level of Optimism*	*Money Pre-ferences*	*TOK Adequacy*
		df =1	*df =1*	*df =1*	*df =1*	*df =2*	*df =1*	*df =1*	*df > 3*	*df =1*	*df =1*	*df =1*	*df =1*	*df =1*
Composite Attitude	+				0.180	0.166	0.227	0.193	0.216					0.213
Composite Perceived Norm	+			0.200		0.157	0.270							0.135
Composite Perceived Behavioural Control	-		0.390	0.193	0.211		0.511	0.279	0.298		0.136	0.182		0.358
Actual Control (TOK)	N/A	0.231	0.294	0.178		0.204	0.356	0.128				0.173		N/A
Composite Intention to Behaviour	+	0.123	0.190	0.159	0.229		0.323	0.145	0.241			0.134		0.349

1) Statistically significant associations (based on Chi-Square Test) are shown with Cramer's V value displayed as measure of strength of association (colour-coded according to below legend based on Cohen, 1988).

Legend: Cramer's V Effect Size
Small Effect Size
Medium Effect Size
Large Effect Size

4.2 Bi- and Multivariate Statistical Analysis

4.2.1 Introduction

Testable hypotheses were derived and defined in Chapter 3. The following sections will report the testing of the hypotheses by applying various statistical methods. The methods utilised include Pearson's correlation coefficient, the coefficient of determination, and multiple linear regression analysis (ANOVA).

The Pearson correlation coefficient r is a statistic quantifying the linear relationship between two variables that are at least interval scaled (Thompson, 2006). A coefficient closer to 1 indicates a stronger relationship, while a coefficient closer to 0 indicates a weaker relationship (Bryman & Bell, 2015). The correlation coefficient is commonly used to measure the size of an effect, as indicated in Table 106.

Table 106 – Correlation Coefficient Effect Sizes

Correlation Coefficient	Effect Size
+/- 0.1	Small effect
+/- 0.3	Medium effect
+/- 0.5	Large effect

Source: Adapted from Field (2013)

The coefficient of determination r^2 is the square value of Pearson's r and expresses how much of the variation in one variable is shared by another variable (Bryman & Bell, 2015; Field, 2013). Nevertheless, correlation coefficients and the coefficient of determination give no indication of the direction of causality and cannot be used to infer causal relationships (Field, 2013; Thompson, 2006). Multiple linear regression analysis is a statistical technique to investigate the relationships between a single (dependent) outcome variable and multiple (independent) predictor variables (Thompson, 2006). Regression analysis is useful for two purposes – prediction and theory testing (Thompson, 2006) – and is frequently used to test the RAA model (Fishbein & Ajzen, 2010, Chapter 6).

4.2.2 Primary Hypotheses

4.2.2.1 Bivariate Statistical Analysis

4.2.2.1.1 Hypothesis H.1-1: Predictor Variable "Attitude"

The first primary null and alternative hypotheses related to the predictor variable "attitude" are as follows:

No.	Predictor Variable	Hypothesis
H.1-1$_a$	Attitude	Stock market attitudes (FA) positively influence the intention to participate in the stock market (BI).
H.1-1$_0$	Attitude	Stock market attitudes (FA) do not influence the intention to participate in the stock market (BI).

To assess the impact of attitude on respondents' intention to participate in the stock market, Pearson's correlation was utilised for the composite attitude scores (see section 3.2.2.2.4.2 for the definition) as well as each sub-component of "attitude" to identify the strength of the association between the predictor variable and the outcome variable "behavioural intention". The correlation was established separately both for the indirect measurement (EVM model) and for the direct measurement (semantic differential). The results are summarised in Table 107, Table 108, and Table 109.

The composite scores yield fairly strong correlations of between 0.454 (composite indirect attitude score; $r = 0.454$ at $p = 0.000 < 0.01$) and 0.540 (composite attitude score; $r = 0.540$ at $p = 0.000 < 0.01$), with the overall composite attitude score exhibiting the strongest correlation. On the individual dimension level, both the indirect and the direct measurement produced statistically significant correlations for all the "attitude" components except "facilitators" and "fast money". In particular, for the component "wealth-creating capacity" (direct measurement), a strong correlation is evident ($r = 0.710$ at $p = 0.000 < 0.01$). With the exception of the aforementioned component dimension, the composite scores yield stronger correlations than the individual components. The coefficient of determination for the composite attitude score is 29.2% ($r^2 = 29.2\%$), indicating that, to this extent, the variability in the outcome variable can be predicted by the predictor variable. Overall, the null hypothesis H.1-1$_0$ is rejected and the alternative hypothesis H.1-1$_a$ is substantiated.

Table 107 – Correlation for Hypothesis H.1-1/Composite Scores

Outcome Variable		Predictor Variables		
		Composite Direct Attitude Score	Composite Indirect Attitude Score	Composite Attitude Score
Intention to Behaviour - Composite Score	Pearson Correlation	.527**	.454**	.540**
	Sig. (1-tailed)	0.000	0.000	0.000
	N	315	315	315
	Coefficient of Determination r^2	27.8%	20.6%	29.2%

Table 108 – Correlation for Hypothesis H.1-1/Direct Measure – Semantic Differential

Outcome Variable		Predictor Variables						
		Score Q.11 MORALITY / "Semantic Differential"	Score Q.11.4 FACILITATORS / "Semantic Differential"	Score Q.11.1 REGULATORS / "Semantic Differential"	Score Q.11.1 ECONOMIC ROLE / "Semantic Differential"	Score Q.11.1 Wealth Creating Capacity / "Semantic Differential"	Score Q.11.1 FAST MONEY / "Semantic Differential"	Q 11.1.5 FAIRNESS / "Semantic Differential"
Intention to Behaviour - Composite Score	Pearson Correlation	.290**	0.011	.284**	.395**	.710**	.488**	.299**
	Sig. (1-tailed)	0.000	0.425	0.000	0.000	0.000	0.000	0.000
	N	315	315	315	315	315	315	315

**. Correlation is significant at the 0.01 level (1-tailed).

*. Correlation is significant at the 0.05 level (1-tailed).

Table 109 – Correlation for Hypothesis H.1-1/Indirect Measure – EVM

Outcome Variable		Predictor Variables						
		Score EVM "Morality"	Score EVM "Facilitators"	Score EVM "Regulators"	Sore EVM "Economic Role"	Score EVM "Wealth Creating Potential"	Score EVM "Fast Money - Recode"	Score EVM "Fairness / Tilted Playing Field"
Intention to Behaviour - Composite Score	Pearson Correlation	.337**	0.040	.142**	.311**	.484**	0.037	.263**
	Sig. (1-tailed)	0.000	0.238	0.006	0.000	0.000	0.254	0.000
	N	315	314	314	315	315	313	314

**. Correlation is significant at the 0.01 level (1-tailed).

*. Correlation is significant at the 0.05 level (1-tailed).

4.2.2.1.2 Hypothesis H.1-2: Predictor Variable "Perceived Social Norms"

The second primary null and alternative hypotheses, related to the predictor variable "perceived behavioural norms", are as follows:

No.	Predictor Variable	Hypothesis
H.1-2_a	Perceived (social) norms	PSNs positively influence the intention to participate in the stock market (BI).
H.1-2_0	Perceived (social) norms	PSNs do not influence the intention to participate in the stock market (BI).

To assess the impact of PSN on the respondents' intention to participate in the stock market, Pearson's correlation was utilised for the composite scores (for the definition, see section 3.2.2.2.3.2) as well as each salient referent to identify the strength of the association between

the predictor variable and the outcome variable “behavioural intention – composite score”. The correlation was calculated separately for composite scores (see Table 110) and for individual salient referents both for descriptive norms (see Table 111) and for injunctive norms (see Table 112).

Both the injunctive and the descriptive norm measurements yielded statistically significant correlations for all “perceived behavioural norm” components except “partner (e.g. spouse or boyfriend)”, which produced a statistically significant correlation for the injunctive norm only, and “public opinion”, which was assessed only for the injunctive norm. It is noticeable that the strongest correlations exist for “parents/legal guardian” and “best friend”, which is reasonable considering that the respondents are comprised of young undergraduate students for whom family and best friends might be the most relevant referents at this stage of their lives. The composite scores, which comprise the sum of all individual salient referents, have significantly higher correlations with the overall composite perceived norm score, scoring the highest value of 0.494 ($r = 0.494$ at $p = 0.000 < 0.01$). The coefficient of determination for the composite perceived norm score amounts to 24.2% ($r^2 = 24.2\%$), indicating that, to this extent, the variability in the outcome variable can be predicted by the predictor variable. Consequently, the null hypothesis $H.1\text{-}2_0$ is rejected and the alternative hypothesis $H.1\text{-}2_a$ is substantiated.

Table 110 – Correlation for Hypothesis H.1-2/Composite Scores

Outcome Variable		Predictor Variables		
		Composite Injunctive Norm Score	Composite Descriptive Norm Score	Composite Perceived Norm Score
Intention to Behaviour - Composite Score	Pearson Correlation	.452**	.423**	.494**
	Sig. (1-tailed)	0.000	0.000	0.000
	N	284	314	315
	Coefficient of Determination r^2	20.4%	17.9%	24.4%
**. Correlation is significant at the 0.01 level (1-tailed).				
*. Correlation is significant at the 0.05 level (1-tailed).				

Table 111 – Correlation for Hypothesis H.1-2/Descriptive Norms

Outcome Variable		Predictor Variables							
		Descriptive Norm: Parents (Legal Guardians)	Descriptive Norm: Siblings (e.g. brothers or sisters)	Descriptive Norm: Partner (e.g. spouse; boy- or girlfriend)	Descriptive Norm: Educators (e.g. teachers or professors)	Descriptive Norm: Best friend	Descriptive Norm: Social peers (colleagues / fellow students / friends)	Descriptive Norm: Financial services professional (e.g. bank advisor)	
Intention to Behaviour - Composite Score	Pearson Correlation	.320**	.253**	0.007	.242**	.337**	.204**	.176**	
	Sig. (1-tailed)	0.000	0.000	0.454	0.000	0.000	0.000	0.001	
	N	315	315	315	315	315	315	315	
**. Correlation is significant at the 0.01 level (1-tailed).									
*. Correlation is significant at the 0.05 level (1-tailed).									

Table 112 – Correlation for Hypothesis H.1-2/Injunctive Norms

Outcome Variable		Predictor Variables								
		Injunctive Norm: Father (male guardian)	Injunctive Norm: Mother (female guardian)	Injunctive Norm: Siblings (e.g. brothers or sisters)	Injunctive Norm: Partner (e.g. spouse; boy- or girlfriend)	Injunctive Norm: Educators (e.g. teachers or professors)	Injunctive Norm: Best Friend	Injunctive Norm: Social Peers	Injunctive Norm: Financial services professional	Injunctive Norm: Public Opinion
Intention to Behaviour - Composite Score	Pearson Correlation	.328**	.307**	.248**	.151*	.265**	.372**	.320**	.282**	.140*
	Sig. (1-tailed)	0.000	0.000	0.000	0.018	0.000	0.000	0.000	0.000	0.016
	N	250	252	242	193	219	238	241	229	235
**. Correlation is significant at the 0.01 level (1-tailed).										
*. Correlation is significant at the 0.05 level (1-tailed).										

4.2.2.1.3 Hypothesis H.1-3: Predictor Variable "Perceived Behavioural Control"

The third primary null and alternative hypotheses, related to the predictor variable "perceived behavioural control", are as follows:

No.	Predictor Variable	Hypothesis
H.1-3$_a$	Perceived behavioural control	PBC (SK) positively influences the intention to participate in the stock market (BI).
H.1-3$_0$	Perceived behavioural control	PBC (SK) does not influence the intention to participate in the stock market (BI).

To assess the impact of perceived behavioural control on the respondents' intention to participate in the stock market, Pearson's correlation was utilised to identify the strength of the association between the predictor variable and the outcome variable "behavioural intention". The correlation was established separately for the composite scores (for the definition, see section 3.2.2.2.1.2) as well as all the PBC measurement items individually, and the results are summarised in the tables below.

All the individual measurement items yielded statistically significant correlations at the $p = 0.01$ significance level (one-tailed). As is reasonably to be expected, the strongest correlations were identified for measurement items that query self-assessment (Q.7.3.3: $r = 0.553$ with $p = 0.000 < 0.01$; see Table 115), comfort level (Q.7.4.3: $r = 0.571$ with $p = 0.000 < 0.01$; see Table 116), and level of certainty (Q.7.5.2: $r = 0.506$ with $p = 0.000 < 0.01$; see Table 116) with specific

reference to SMP. The “composite perceived behavioural control score” has the strongest correlation ($r = 0.601$ at $p = 0.000 < 0.01$) when compared with the first-level composite scores as well as the individual items. The coefficient of determination for the composite perceived behavioural control score is 36.1% ($r^2 = 36.1\%$), indicating that the variability in the outcome variable can be predicted by the predictor variable to this extent. This coefficient of determination score is higher than that for the predictor variables in H.1-1 and H.1-2, respectively. Consequently, the null hypothesis $H.1\text{-}3_0$ is rejected and the alternative hypothesis $H.1\text{-}3_a$ is substantiated.

Table 113 – Correlation for Hypothesis H.1-3/Composite Scores

Outcome Variable		Predictor Variables				
		Composite PBC Control Belief Score	Composite PBC Self-Assessment Score	Composite PBC Comfort Score	Composite PBC Certainty Score	**Composite Perceived Behavioural Control Score**
Intention to Behaviour - Composite Score	Pearson Correlation	.565**	.491**	.548**	.521**	**.601****
	Sig. (1-tailed)	0.000	0.000	0.000	0.000	**0.000**
	N	315	315	315	315	**315**
	Coefficient of Determination r^2	31.9%	24.1%	30.0%	27.1%	**36.1%**

**. Correlation is significant at the 0.01 level (1-tailed).

*. Correlation is significant at the 0.05 level (1-tailed).

Table 114 – Correlation for Hypothesis H.1-3/Indirect Measurement (Belief Statements)

Outcome Variable		Predictor Variables		
		Q 7.2.1 PBC / Control beliefs - Agreement to statement "I believe that I currently possess the required knowledge and skills to succesfully invest in the stock market."	Q 7.2.2 PBC / Control beliefs - Agreement to statement "If I really wanted to, I could successfully invest in the stock market."	Q 7.2.3 PBC / Control beliefs - Agreement to statement "My investing in the stock market successfully is mainly up to me."
Intention to Behaviour - Composite Score	Pearson Correlation	.492**	.499**	.366**
	Sig. (1-tailed)	0.000	0.000	0.000
	N	315	315	315

**. Correlation is significant at the 0.01 level (1-tailed).

*. Correlation is significant at the 0.05 level (1-tailed).

Table 115 – Correlation for Hypothesis H.1-3/Self-Assessment

Outcome Variable		Predictor Variables			
		Q 7.3.1 PBC / Self Assessment of "overall financial knowledge"	Q 7.3.2 PBC / Self Assessment of "required knowledge to manage your personal finances"	Q 7.3.3 PBC / Self Assessment of "financial knowledge concerning investing in stock markets"	Q 7.3.4 PBC / Self Assessment of "financial knowledge as it relates to financial products (bank products, insurances, financial markets products such as stocks, bonds, mutual funds, etc.)"
Intention to Behaviour - Composite Score	Pearson Correlation	.362**	.248**	.553**	.472**
	Sig. (1-tailed)	0.000	0.000	0.000	0.000
	N	315	315	315	315
**. Correlation is significant at the 0.01 level (1-tailed).					
*. Correlation is significant at the 0.05 level (1-tailed).					

Table 116 – Correlation for Hypothesis H.1-3/Direct Measurement (Comfort and Certainty Level)

Outcome Variable		Predictor Variables				
		Q 7.4.1 PBC / Comfort level to "manage your personal finances"	Q 7.4.2 PBC / Comfort level to "invest in the stock market"	Q 7.4.3 PBC / Comfort level to "choose and buy financial products"	Q 7.5.1 PBC / Level of Certainty that "success in investing in the stock market is in your control?"	Q 7.5.2 PBC / Level of Certainty that "you have the required ability to invest successfully in the stock market?"
Intention to Behaviour - Composite Score	Pearson Correlation	.226**	.571**	.513**	.397**	.506**
	Sig. (1-tailed)	0.000	0.000	0.000	0.000	0.000
	N	315	315	315	315	315
**. Correlation is significant at the 0.01 level (1-tailed).						
*. Correlation is significant at the 0.05 level (1-tailed).						

4.2.2.2 Multivariate Statistical Analysis

The fourth set of primary null and alternative hypotheses, related to all the predictor variables of the RAA framework, are as follows:

No.	Predictor Variable	Hypothesis
H.1-4$_a$	Attitude, perceived norm Perceived behavioural control	The predictor variables (FA, PSN, and PBC) will significantly explain the variance in the outcome variable intention to participate in the stock market (BI).
H.1-4$_0$		The predictor variables (FA, PSN, and PBC) will not significantly explain the variance in the outcome variable intention to participate in the stock market (BI).

To test this hypothesis, multiple linear regression analysis was conducted in three steps:

- Step 1: Hierarchical regression analysis utilising all background/control factors as a starting point and then entering the RAA predictors into the model to ascertain whether this improves the prediction of BI (outcome variable).

- Step 2: In an alternative linear regression model based on the detailed analysis of the component factors in section 4.2.2, alternative predictor combinations will be assessed, replacing the RAA composite scores with salient component scores.

4.2.2.2.1 Step 1: Hierarchical Linear Regression

The outputs of the Step 1 multiple linear regression analysis are shown in the following tables. In hierarchical regression, the researcher decides in which order to enter the predictors into the model. Starting with the inclusion of all the background factors (socio-demographic, character based, and risk aversion) in Model 1, in Model 2, the RAA predictor values were entered to determine whether the predictive value of the model can be improved while controlling statistically for the background factors. In Model 3, the TOK score was added. The sequence of variables entered is detailed in Table 117.

Table 117 – Multiple Regression (Hierarchical) – Variables Entered

Model	Variables Entered	Variables Removed	Method
1	B_RiskAversion=Group 1 - Least Risk Averse, B_Edu_Guardian_ALL=Academic, Sex, Nationality, Score - Money Preferences, Study Subject (Business vs. Non-Business), Score - Disposition to Trust, B_RiskAversion=Group 3 - Risk Averse, Personal Finance Education received prior to university studies, Q2.20=I live with other family, friends, or roommates., Score - Sociability, B_RiskAversion=Group 4 - Most Risk Averse, Practical Experience SMP, Score - Level of Optimism, Q2.20=I live in my parents' home, B_RiskAversion=Group 2 - Medium Risk Averse[b]		Enter
2	Composite Attitude Score , Composite Perceived Norm Score , Composite Perceived Behavioural Control Score[b]		Enter
3	Total Objective Financial Knowledge - SCORE[b]		Enter

a. Dependent Variable: Intention to Behaviour - Composite Score

b. All requested variables entered.

Table 118 – Multiple Regression (RAA Predictors) – Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.615[a]	0.378	0.345	1.30992	0.378	11.333	16	298	0.000	
2	.754[b]	0.568	0.541	1.09702	0.190	43.297	3	295	0.000	
3	.762[c]	0.581	0.552	1.08307	0.012	8.646	1	294	0.004	2.051

a. Predictors: (Constant), B_RiskAversion=Group 1 - Least Risk Averse, B_Edu_Guardian_ALL=Academic, Sex, Nationality, Score - Money Preferences, Study Subject (Business vs. Non-Business), Score - Disposition to Trust, B_RiskAversion=Group 3 - Risk Averse, Personal Finance Education received prior to university studies, Q2.20=I live with other family, friends, or roommates., Score - Sociability, B_RiskAversion=Group 4 - Most Risk Averse, Practical Experience SMP, Score - Level of Optimism, Q2.20=I live in my parents' home, B_RiskAversion=Group 2 - Medium Risk Averse

b. Predictors: (Constant), B_RiskAversion=Group 1 - Least Risk Averse, B_Edu_Guardian_ALL=Academic, Sex, Nationality, Score - Money Preferences, Study Subject (Business vs. Non-Business), Score - Disposition to Trust, B_RiskAversion=Group 3 - Risk Averse, Personal Finance Education received prior to university studies, Q2.20=I live with other family, friends, or roommates., Score - Sociability, B_RiskAversion=Group 4 - Most Risk Averse, Practical Experience SMP, Score - Level of Optimism, Q2.20=I live in my parents' home, B_RiskAversion=Group 2 - Medium Risk Averse, Composite Attitude Score , Composite Perceived Norm Score , Composite Perceived Behavioural Control Score

c. Predictors: (Constant), B_RiskAversion=Group 1 - Least Risk Averse, B_Edu_Guardian_ALL=Academic, Sex, Nationality, Score - Money Preferences, Study Subject (Business vs. Non-Business), Score - Disposition to Trust, B_RiskAversion=Group 3 - Risk Averse, Personal Finance Education received prior to university studies, Q2.20=I live with other family, friends, or roommates., Score - Sociability, B_RiskAversion=Group 4 - Most Risk Averse, Practical Experience SMP, Score - Level of Optimism, Q2.20=I live in my parents' home, B_RiskAversion=Group 2 - Medium Risk Averse, Composite Attitude Score , Composite Perceived Norm Score , Composite Perceived Behavioural Control Score , Total Objective Financial Knowledge - SCORE

d. Dependent Variable: Intention to Behaviour - Composite Score

Table 118 presents the regression model summary. The R value represents the multiple correlation coefficient between the predictors and the outcome. The R value of 0.615 ($R_{BI\ Model\ 1}$ = 0.615) in Model 1 and, respectively, those of Model 2 ($R_{BI\ Model\ 2}$ = 0.754) and Model 3 ($R_{BI\ Model\ 3}$ = 0.762) represent a large effect size when applying the criteria stipulated in Table 106.

The R-square provides a gauge of the substantive size of the linear regression fit by representing the percentage of variation in the outcome that can be explained by the model (Field, 2013). The R-square for Model 1 is 37.8% ($R^2_{BI\ Model\ 1}$ = 0.378), suggesting that Model 1 can explain a significant portion of the variance of the outcome variable. However, the R-square value for Model 2 is increased by 19% (R-square change = 0.190) to $R^2_{BI\ Model\ 2}$ = 0.568, implying that there is a significant influence and improvement in the predictive value from the RAA predictor variables on the outcome variable "behavioural intention" while controlling statistically for the variables. Model 2 consequently can explain 56.8% of the variance in the outcome variable BI. The adjusted R-square value (adjusted $R^2_{BI\ Model\ 2}$ = 0.541) is close to the value of R-square, suggesting that, if the model was derived from the overall population rather than a sample, it would account for only 2.7% less variance in the outcome. Consequently, the cross-validity of the Model 2 can be considered to be adequate. The addition of the TOK score to Model 3 provides only a modest improvement of 1.2% (R-square change = 0.012) over Model 2.

Table 119 – Multiple Regression (RAA Predictors) – ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	311.138	16	19.446	11.333	.000[b]
	Residual	511.335	298	1.716		
	Total	822.473	314			
2	Regression	467.454	19	24.603	20.444	.000[c]
	Residual	355.019	295	1.203		
	Total	822.473	314			
3	Regression	477.596	20	23.880	20.357	.000[d]
	Residual	344.877	294	1.173		
	Total	822.473	314			

a. Dependent Variable: Intention to Behaviour - Composite Score

b. Predictors: (Constant), B_RiskAversion=Group 1 - Least Risk Averse, B_Edu_Guardian_ALL=Academic, Sex, Nationality, Score - Money Preferences, Study Subject (Business vs. Non-Business), Score - Disposition to Trust, B_RiskAversion=Group 3 - Risk Averse, Personal Finance Education received prior to university studies, Q2.20=I live with other family, friends, or roommates., Score - Sociability, B_RiskAversion=Group 4 - Most Risk Averse, Practical Experience SMP, Score - Level of Optimism, Q2.20=I live in my parents' home, B_RiskAversion=Group 2 - Medium Risk Averse

c. Predictors: (Constant), B_RiskAversion=Group 1 - Least Risk Averse, B_Edu_Guardian_ALL=Academic, Sex, Nationality, Score - Money Preferences, Study Subject (Business vs. Non-Business), Score - Disposition to Trust, B_RiskAversion=Group 3 - Risk Averse, Personal Finance Education received prior to university studies, Q2.20=I live with other family, friends, or roommates., Score - Sociability, B_RiskAversion=Group 4 - Most Risk Averse, Practical Experience SMP, Score - Level of Optimism, Q2.20=I live in my parents' home, B_RiskAversion=Group 2 - Medium Risk Averse, Composite Attitude Score , Composite Perceived Norm Score , Composite Perceived Behavioural Control Score

d. Predictors: (Constant), B_RiskAversion=Group 1 - Least Risk Averse, B_Edu_Guardian_ALL=Academic, Sex, Nationality, Score - Money Preferences, Study Subject (Business vs. Non-Business), Score - Disposition to Trust, B_RiskAversion=Group 3 - Risk Averse, Personal Finance Education received prior to university studies, Q2.20=I live with other family, friends, or roommates., Score - Sociability, B_RiskAversion=Group 4 - Most Risk Averse, Practical Experience SMP, Score - Level of Optimism, Q2.20=I live in my parents' home, B_RiskAversion=Group 2 - Medium Risk Averse, Composite Attitude Score , Composite Perceived Norm Score , Composite Perceived Behavioural Control Score , Total Objective Financial Knowledge - SCORE

Table 119 outlines the results of the ANOVA test. The F-ratio is a measure of the ratio of the variation explained by the model and the variation explained by unsystematic factors (Field, 2013). The F-ratio for Model 3 amounts to 20.357 ($F_{BI\ Model\ 3} = 20.357$ with $p = 0.000 < 0.01$) and is significant at the 0.01 level.

Table 120 – Hierarchical Multiple Regression – Statistically Significant Standardised Coefficients β

Predictor Variables [a.]	Model 1			Model 2			Model 3		
	Beta β	Sig.		Beta β	Sig.		Beta β	Sig.	
Nationality	0.097	0.047	A)	0.096	0.019	A)	0.070	0.090	B)
Sex	-0.215	0.000	A)	-0.145	0.001	A)	-0.125	0.005	A)
Study Subject (Business vs. Non-Business)	0.154	0.002	A)	0.072	0.087	B)	0.044	0.303	B)
Personal Finance Education received prior to university studies	0.112	0.023	A)	0.064	0.121	B)	0.075	0.068	B)
Practical Experience SMP	0.358	0.000	A)	0.113	0.026	A)	0.096	0.055	B)
Q2.20=I live in my parents' home	0.186	0.001	A)	0.133	0.005	A)	0.097	0.037	A)
Q2.20=I live with other family, friends, or roommates.	0.080	0.156		0.087	0.065		0.134	0.004	A)
B_RiskAversion=Group 4 - Most Risk Averse	-0.211	0.004	A)	-0.160	0.009	A)	-0.173	0.004	A)
Composite Perceived Behavioural Control Score	N/A	N/A	C)	0.253	0.000	A)	0.228	0.000	A)
Composite Perceived Norm Score	N/A	N/A	C)	0.263	0.000	A)	0.254	0.000	A)
Composite Attitude Score	N/A	N/A	C)	0.202	0.000	A)	0.194	0.000	A)
Total Objective Financial Knowledge - SCORE	N/A	N/A	C)	N/A	N/A	C)	0.135	0.004	A)

A) Statistically Significant at p<0.05

B) Statistically insignificant but significant in prior model(s)

C) Not included in Model

a. Dependent Variable: Intention to Behaviour -

The standardised regression coefficients β indicate the strength of the relationship between a predictor and an outcome variable in a standardised form: this signifies the change in standard deviations in the outcome variable if there is a one standard deviation change in the predictor variable (Field, 2013). Consequently, the analysis of β is particularly useful within the RAA framework as it reflects the independent contributions of FA, PSN, and PBC to the prediction of BI (Fishbein & Ajzen, 2010).

Table 120 summarises the statistically significant predictor variables for all three models in the hierarchical regression analysis (for a complete overview of the regression coefficients, see Appendix J). The following observations can be made:

- All the RAA predictor variables (Models 2 and 3) as well as the TOK score (in Model 3) are statistically significant at the 0.01 level.
- Assessing Model 3, for a change of one standard deviation in the predictor "perceived norm score" (β = 0.254), a 0.254 standard deviation change in the outcome variable "behavioural intention" can be predicted. The predictor variables "perceived behavioural control" (β = 0.228) and "attitude" (β = 0.194) also make a significant positive contribution to the prediction of BI.
- The "TOK score" variable is added only to Model 3 (β = 0.135) and is statistically significant at $p < 0.01$. Concurrently, the PBC β value drops from 0.253 to 0.228.
- The socio-demographic background variable "sex" is statistically significant across all models at $p < 0.01$ and has a negative sign, which is indicative of the gender gap (see section 2.4.4.2) frequently identified in prior research indicating that women are less likely to participate in the stock market. The β value for sex falls quite noticeably from Model 1 (β = -0.215) to Model 2 (β = -0.145) and again to Model 3 (β = -0.125).
- The socio-demographic background variables "study subject" and "personal finance education" are statistically significant in Model 1 at $p < 0.05$ but insignificant in Models 2 and 3. Similarly, "nationality" is statistically significant in Models 1 and 2 but not in Model 3.
- The socio-demographic background variable "practical SMP experience" is statistically significant across all the models at $p < 0.05$. The β value for "practical SMP experience" reduces quite noticeably from Model 1 (β = 0.358) to Model 2 (β = 0.113) and again to Model 3 (β = 0.096).
- The dummy variable "I live in my parents' home" is statistically significant across all the models at $p < 0.05$. The β value for "I live in my parents' home" falls quite noticeably from Model 1 (β = 0.186) to Model 2 (β = 0.133) and again to Model 3 (β = 0.097).

- The dummy variable “I live with other family, friends, or roommates” (β = 0.134) is statistically significant at $p < 0.05$ only in Model 3.
- The character-based background variable “risk aversion” is statistically significant across all the models at $p < 0.01$ in the form of dummy variable “RiskAversion = Group 4 – most risk averse” and has a negative sign, which is indicative of the findings identified in prior research (see section 2.4.4.4) suggesting that risk-averse persons are less likely to participate in the stock market. The β value reduces quite noticeably from Model 1 (β = -0.211) to Model 2 ($\beta_{\text{Model 2}}$ = -0.160).
- Apart from “risk aversion”, no other character-based factors are statistically significant in predicting BI. This finding suggests that those characteristics are not directly associated with BI but rather influence the predictor variables.

Multicollinearity exists when there is a strong correlation between two or more predictor variables (Field, 2013). Field (2013) defines correlations in excess of 0.80 as strong in the context of multicollinearity. Although the RAA predictor variables in the models are correlated, they are not correlated too strongly with each other (r between 0.325 and 0.537 with $p = 0.000 < 0.01$ in all instances; see Appendix J). Similarly, the variance inflation factor (VIF) and the tolerance statistic (see Appendix J) reported do not raise concerns about multicollinearity threatening the model estimates.[19] Consequently, it can be concluded that the model is valid and reliable. Therefore, the null hypothesis $H.1\text{-}4_0$ is rejected and the alternative hypothesis $H.1\text{-}4_a$ is substantiated.

4.2.2.2.2 Step 2: Alternative Model

Analysing the correlation between the predictor “attitude” and the outcome variable “intention”, it is apparent that the correlation coefficient for the component dimension “wealth-creating capacity” based on the direct measurement approach (see Table 108 in section 4.2.2.1.1) exceeds the correlation coefficient r and the coefficient of determination r^2 for the composite attitude score considerably (component “wealth-creating capacity”: r = 0.710 and r^2 = 50.41% whereas composite attitude score: r = 0.540 and r^2 = 29.2%). Consequently, the basic multiple linear regression model was performed, substituting the predictor “composite attitude score” for the component score “Score Q.11.1 Wealth-Creating Capacity/Semantic Differential” (subsequently referred to as the “alternative model” or “Model 4”). The complete regression results are provided in Appendix K with the salient factors summarised in the following tables.

[19] According to Field (2013), concerns about multicollinearity are warranted if the largest VIF is greater than 10, the average VIF is substantially greater than 1, or the tolerance values are below 0.2.

Table 121 – Multiple Regression (Alternative Model) – Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
4	.803[a]	0.645	0.620	0.99777	0.645	25.389	21	293	0.000	2.094

a. Predictors: (Constant), Total Objective Financial Knowledge - SCORE, B_RiskAversion=Group 1 - Least Risk Averse, Q2.20=I live alone (only adult in household), Personal Finance Education received prior to university studies, Score - Disposition to Trust, Score - Money Preferences, B_RiskAversion=Group 3 - Risk Averse, Sex, Score - Sociability, Study Subject (Business vs. Non-Business), B_Edu_Guardian_ALL=Academic, Nationality, Composite Perceived Norm Score , B_RiskAversion=Group 4 - Most Risk Averse, Q2.20=I live in my parents' home, Score - Level of Optimism, Practical Experience SMP, Score Q.11.1 Wealth Creating Capacity / "Semantic Differential" (SUM(Q11.1_1_BIPOLAR,Q11.2_5_BIPOLAR,Q11.3_2_BIPOLAR) / 3), Composite Perceived Behavioural Control Score , B_RiskAversion=Group 2 - Medium Risk Averse, Q2.20=I live with other family, friends, or roommates.

b. Dependent Variable: Intention to Behaviour - Composite Score

Table 122 – Multiple Regression (Alternative Model) – ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
4	Regression	530.780	21	25.275	25.389	.000[b]
	Residual	291.692	293	0.996		
	Total	822.473	314			

a. Dependent Variable: Intention to Behaviour - Composite Score

b. Predictors: (Constant), Total Objective Financial Knowledge - SCORE, B_RiskAversion=Group 1 - Least Risk Averse, Q2.20=I live alone (only adult in household), Personal Finance Education received prior to university studies, Score - Disposition to Trust, Score - Money Preferences, B_RiskAversion=Group 3 - Risk Averse, Sex, Score - Sociability, Study Subject (Business vs. Non-Business), B_Edu_Guardian_ALL=Academic, Nationality, Composite Perceived Norm Score , B_RiskAversion=Group 4 - Most Risk Averse, Q2.20=I live in my parents' home, Score - Level of Optimism, Practical Experience SMP, Score Q.11.1 Wealth Creating Capacity / "Semantic Differential" (SUM(Q11.1_1_BIPOLAR,Q11.2_5_BIPOLAR,Q11.3_2_BIPOLAR) / 3), Composite Perceived Behavioural Control Score , B_RiskAversion=Group 2 - Medium Risk Averse, Q2.20=I live with other family, friends, or roommates.

Table 123 – Multiple Regression (Alternative Model) – Statistically Significant Standardised Coefficients

Predictor Variables [a.]	Model 3			Alternative Model / Model 4		
	Beta β	Sig.		Beta β	Sig.	
Sex	-0.125	0.005	A)	-0.111	0.007	A)
Personal Finance Education received prior to university studies	0.075	0.068	B)	0.080	0.035	A)
Practical Experience SMP	0.096	0.055	B)	0.104	0.025	A)
Score - Level of Optimism	0.027	0.614		-0.091	0.029	A)
Q2.20=I live in my parents' home	0.097	0.037	A)	0.016	0.783	
Q2.20=I live with other family, friends, or roommates.	0.134	0.004	A)	0.035	0.570	
B_RiskAversion=Group 4 - Most Risk Averse	-0.173	0.004	A)	-0.174	0.002	A)
Composite Perceived Behavioural Control Score	0.228	0.000	A)	0.133	0.012	A)
Composite Perceived Norm Score	0.254	0.000	A)	0.149	0.001	A)
Composite Attitude Score	***0.194***	***0.000***	A)	***N/A***	***N/A***	C)
Score Q.11.1 Wealth Creating Capacity	***N/A***	***N/A***	C)	***0.438***	***0.000***	A)
Total Objective Financial Knowledge - SCORE	0.135	0.004	A)	0.098	0.022	A)

A) Statistically Significant at p<0.05

B) Statistically insignificant but significant in prior model(s)

C) Not included in Model

a. Dependent Variable: Intention to Behaviour - Composite Score

The R-square for the alternative model amounts to 64.5% (R-square $_{\text{Model 4}}$ = 0.645), which is an improvement of 6.4 percentage points over Model 3 in Step 1 (R Square $_{\text{Model 3}}$ = 0.581; see section 4.2.2.2.1), suggesting that the alternative model can explain a greater portion of the variance of the outcome variable by substituting the composite attitude score with the direct

measurement attitude dimension score “wealth-creating capacity” (see section 4.1.3.6.2). Similar to the models in Step 1 (section 4.2.2.2.1), the adjusted R-square value (adjusted R-square $_{\text{Model 4}}$ = 0.620) is close to the value of R-square, suggesting that, if the model was derived from the overall population rather than a sample, it would account for only 2.5% less variance in the outcome. Consequently, the cross-validity of the alternative model can also be considered to be adequate.

Table 123 summarises the alternative model’s statistically significant standardised coefficients and contrasts them with Model 3 from Step 1 (section 4.2.2.2.1). In contrast to Model 3, the alternative predictor variable “Score Q.11.1 Wealth-Creating Capacity/Semantic Differential” makes the largest contribution to the prediction of intention with $\beta_{\text{Model 4}}$ = 0.438, while the contributions of the remaining RAA predictors and TOK are – while still significant – considerably reduced. The variance inflation factor (VIF) and the tolerance statistic reported (see Appendix K) do not raise concerns about multicollinearity threating the alternative model estimates, although the values have deteriorated slightly in comparison with the RAA model due to the higher correlation of the alternative “attitude” predictor with the other predictor variables. Consequently, it can be concluded that the alternative model is equally valid and reliable, achieving a higher predictive value than the RAA model (Model 3). Therefore, the null hypothesis H.1-4_0 is rejected and the alternative hypothesis H.1-4_a is substantiated for the alternative model as well.

By breaking down the “Score Q.11.1 Wealth-Creating Capacity/Semantic Differential” into its three component items (see 4.1.3.6.2 for details) and substituting them into the alternative model (dubbed “Model 4b”), the contribution of each semantic differential item can be analysed individually, which indicates that the assessment of the valuable contribution of SMP to one’s future (see Q.11.3.2) might be a key component of the prediction of SMP behaviour. The R-square for Model 4b accounts for 67.2% (R-square $_{\text{Model 4b}}$ = 0.672), which is an improvement of 2.7 percentage points over Model 4 (R Square $_{\text{Model 4}}$ = 0.645). The comparison between Model 4’s and Model 4b’s statistically significant standardised coefficients is shown in Table 124 (see Appendix K for the complete regression statistics of Model 4b).

Table 124 – Multiple Regression (Alternative Model) – Substitution of the Wealth-Creating Score with Individual Items

Predictor Variables [a.]	Alternative Model / Model 4			Alternative Model / Model 4b		
	Beta β	Sig.		Beta β	Sig.	
Sex	-0.111	0.007	A)	-0.097	0.150	A)
Personal Finance Education received prior to university studies	0.080	0.035	A)	0.070	0.055	
Practical Experience SMP	0.104	0.025	A)	0.106	0.018	A)
Score - Level of Optimism	-0.091	0.029	A)	-0.078	0.052	
Q2.20=I live in my parents' home	0.016	0.783		0.006	0.921	
Q2.20=I live with other family, friends, or roommates.	0.035	0.570		0.053	0.376	
B_RiskAversion=Group 4 - Most Risk Averse	-0.174	0.002	A)	-0.164	0.002	A)
Composite Perceived Behavioural Control Score	0.133	0.012	A)	0.154	0.003	A)
Composite Perceived Norm Score	0.149	0.001	A)	0.132	0.003	A)
Score Q.11.1 Wealth Creating Capacity Semantic Differential	***0.438***	***0.000***	A)	*N/A*	*N/A*	B)
Q 11.1.1 SMI / Semantic Differential "Wealth creating:Wealth destroying"	*N/A*	*N/A*	B)	***0.043***	0.346	
Q 11.2.5 SMI / Semantic Differential "Rewards outweigh Risks:Risks outweigh Rewards"	*N/A*	*N/A*	B)	***0.084***	0.073	
Q 11.3.2 SMI / Semantic Differential "valuable:worthless"	*N/A*	*N/A*	B)	***0.389***	***0.000***	A)
Total Objective Financial Knowledge - SCORE	0.098	0.022	A)	0.095	0.022	A)

A) Statistically Significant at p<0.05

B) Not included in Model

a. Dependent Variable: Intention to Behaviour - Composite Score

The alternative model suggests that – while overall validating the RAA approach – acknowledgement of the wealth-creating capacity of SMP might be a key predictor of SMP intention.

4.2.3 Secondary Hypotheses

4.2.3.1 Introduction

The secondary hypotheses further analyse the relationship between the RAA predictor variables and the background variables. To test the secondary hypotheses, initially a bivariate correlation analysis (Pearson correlations) was conducted. In the second step, a hierarchical multiple linear regression analysis was performed, including all the character-based, socio-demographic background variables as predictors in Model 1, with the relevant RAA predictor composite score as the dependent variable. Subsequently, the other RAA predictor variables and the TOK score were entered into the model (Model 2). The relevant null hypotheses were rejected only when a statistically significant correlation and prediction within Regression Model 2 were noted for any given factor. The salient findings are summarised below.

4.2.3.2 Prediction of Attitude

No.	Predictor Variables	Alternative Hypothesis	Null Hypothesis
H.2-1	Character-based variables	Character-based variables will significantly predict the variance in attitude towards the stock market.	Character-based variables will **not** significantly predict the variance in attitude towards the stock market.
H.2-2	Socio-demographic variables	Socio-demographic variables will significantly predict the variance in attitude towards the stock market.	Socio-demographic variables will **not** significantly predict the variance in attitude towards the stock market.
H.2-3	Objective control (OK)	Objective control will significantly predict the variance in attitude towards the stock market.	Objective control will **not** significantly predict the variance in attitude towards the stock market.

Correlation analysis (Pearson correlations) was conducted between the character-based, socio-demographic, and TOK score and the composite RAA predictor for the composite attitude scores (direct and indirect measurement as well as overall measurement; see Table 125).

Table 125 – Correlation for Hypothesis H.2: Prediction of Attitudes/Composite Scores

	Composite Attitude Score		Composite Direct Attitude Score	Composite Indirect Attitude Score
	Pearson Correlation r	Coefficient of Determination r^2	Pearson Correlation r	Pearson Correlation r
Nationality	**0.005**	**0.0%**	-0.009	0.015
Sex	**-.174****	**3.0%**	-.120*	-.188**
Study Subject (Business vs. Non-Business)	**.135***	**1.8%**	.136*	0.110
Personal Finance Education received prior to university studies	**.175****	**3.1%**	.135*	.176**
Education Legal Guardian All	**.153****	**2.3%**	.135*	.141*
Practical Experience SMP	**.345****	**11.9%**	.296**	.323**
B_RiskAversion=Group 5 - Do not know	**-0.040**	**0.2%**	-0.048	-0.026
B_RiskAversion=Group 4 - Most Risk Averse	**-.141***	**2.0%**	-.129*	-.125*
B_RiskAversion=Group 3 - Risk Averse	**-.134***	**1.8%**	-.137*	-0.107
B_RiskAversion=Group 2 - Medium Risk Averse	**.164****	**2.7%**	.153**	.144*
B_RiskAversion=Group 1 - Least Risk Averse	**.147****	**2.2%**	.159**	0.110
Risk Aversion (Q.6.1_Dichotomous)	**.257****	**6.6%**	.255**	.212**
Score - Disposition to Trust	**0.003**	**0.0%**	0.008	-0.002
Score - Sociability	**0.078**	**0.6%**	0.063	0.077
Score - Level of Optimism	**.217****	**4.7%**	.214**	.180**
Score - Money Preferences	**-0.041**	**0.2%**	-0.058	-0.019
Total Objective Financial Knowledge - SCORE	**.275****	**7.6%**	.240**	.255**
Basic Objective Financial Knowledge - SCORE	**.147****	**2.2%**	.114*	.148**
Advanced Objective Financial Knowledge - SCORE	**.293****	**8.6%**	.261**	.266**

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

The correlation analysis for the RAA predictor "attitude" (see Table 125) suggests that a medium effect size ($r > 0.30$, see Table 106) exists for "practical SMP experience" ($r^2 = 11.9\%$, $p < 0.01$), for which it is expected that a respondent who is already participating in the stock

market will exhibit a more positive attitude than a non-participator. Sizable effect sizes can also be noted for AOK (r^2 = 8.6%, $p < 0.01$) and TOK (r^2 = 7.6%, $p < 0.01$), with AOK appearing to be the slightly better predictor. It is noticeable that BOK, while also a statistically significant predictor ($p < 0.01$), achieves only r^2 = 2.2%. Risk aversion (Q.6.1_Dichotomous) as well as the individual correlations for the dummy variable risk aversion groups 1 to 4 suggest that greater risk aversion results in a markedly more negative attitude. Analysing the individual attitude components, the most distinct difference results from the dimension "wealth-creating capacity" (Group 4 – most risk averse: $r = -0.196$, $p < 0.01$ compared with Group 1 – least risk averse: $r = 0.262$, $p < 0.01$). In general, the dimension "wealth-creating capacity" appears to generate the strongest correlation of effect sizes, suggesting that the assessment of this dimension is the most indicative of the overall attitude towards SMP. Other significant correlations at $p < 0.01$ are notable for "sex" (r^2 = 3.0%), with the negative correlation ($r = -0.174$) suggesting that women have a more negative attitude towards the stock market, as well as "personal finance education" (r^2 = 3.1%), "education of legal guardian" (r^2 = 2.3%), and "level of optimism" (r^2 = 4.7%).

Table 126 – Multiple Regression (Prediction of Attitude) – Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.482[a]	0.232	0.186	9.74464	0.232	4.978	18	296	0.000	
2	.638[b]	0.407	0.367	8.59355	0.175	43.304	2	294	0.000	2.015

a. Predictors: (Constant), Total Objective Financial Knowledge - SCORE, B_RiskAversion=Group 1 - Least Risk Averse, Q2.20=I live alone (only adult in household), Personal Finance Education received prior to university studies, Score - Disposition to Trust, Score - Money Preferences, B_RiskAversion=Group 3 - Risk Averse, Sex, Score - Sociability, Study Subject (Business vs. Non-Business), B_Edu_Guardian_ALL=Academic, Nationality, B_RiskAversion=Group 4 - Most Risk Averse, Q2.20=I live in my parents' home, Score - Level of Optimism, Practical Experience SMP, B_RiskAversion=Group 2 - Medium Risk Averse, Q2.20=I live with other family, friends, or roommates.

b. Predictors: (Constant), Total Objective Financial Knowledge - SCORE, B_RiskAversion=Group 1 - Least Risk Averse, Q2.20=I live alone (only adult in household), Personal Finance Education received prior to university studies, Score - Disposition to Trust, Score - Money Preferences, B_RiskAversion=Group 3 - Risk Averse, Sex, Score - Sociability, Study Subject (Business vs. Non-Business), B_Edu_Guardian_ALL=Academic, Nationality, B_RiskAversion=Group 4 - Most Risk Averse, Q2.20=I live in my parents' home, Score - Level of Optimism, Practical Experience SMP, B_RiskAversion=Group 2 - Medium Risk Averse, Q2.20=I live with other family, friends, or roommates., Composite Perceived Norm Score , Composite Perceived Behavioural Control Score

c. Dependent Variable: Composite Attitude Score

The second step is comprised of a hierarchical multiple linear regression analysis. Table 126 summarises the regression model. The R value of 0.638 ($R_{\text{FA Model 2}} = 0.638$), representing the multiple correlation coefficient between the predictors and the outcome, represents a medium effect size when applying the criteria stipulated in Table 106. The R-square for the model is 40.7% ($\text{R-square}_{\text{FA Model 2}} = 0.407$), suggesting that the model can explain a significant portion of the variance of the outcome variable "attitude".

Table 127 – Multiple Regression (Prediction of Attitude) – Statistically Significant Standardised Coefficients

Predictor Variables [a.]	Model 1			Model 2		
	Beta β	Sig.		Beta β	Sig.	
Practical Experience SMP	0.224	0.000	A)	-0.020	0.734	B)
Score - Disposition to Trust	0.129	0.027	A)	0.113	0.029	A)
Score - Level of Optimism	0.183	0.002	A)	0.159	0.003	A)
Total Objective Financial Knowledge - SCORE	0.153	0.012	A)	0.047	0.392	B)
Composite Perceived Behavioural Control Score	N/A	N/A	C)	0.400	0.000	A)
Composite Perceived Norm Score	N/A	N/A	C)	0.299	0.000	A)

A) Statistically Significant at p<0.05
B) Statistically insignificant but significant in prior model(s)
C) Not included in Model
a. Dependent Variable: Composite Attitude

Table 127 summarises the model's coefficients. It is noticeable in Model 1 that, of the socio-demographic variables, only "practical SMP experience" has a significant impact on "attitude". However, this impact becomes insignificant with the addition of the other RAA predictor scores. All the other socio-demographic factors do not contribute significantly to explaining the variance in the outcome variable "attitude". For the character-based variables, a higher level of "disposition to trust" and a higher "level of optimism" explain a more positive "attitude". These effects remain significant across both models, suggesting a direct relationship. However, "disposition to trust" does not show a statistically significant correlation with FA (see Table 125); consequently, based on this mixed finding, the null hypothesis cannot be rejected for this variable. The addition of the PSN and PBC scores in Model 2 suggests that the RAA predictor variables influence each other, which is a reasonable assumption. Objective control also significantly predicts the levels of "attitude" only in Model 1 and becomes insignificant, arguably with the inclusion of the PBC score (representing SK), in Model 2. Consequently, the null hypotheses H.2-1 to H.2-3 can be accepted for a range of variables but rejected for others, as outlined above. The conclusions of the secondary hypothesis testing are summarised in section 4.2.3.6 (see Table 137).

4.2.3.3 Prediction of Perceived Behavioural Control

No.	Predictor Variables	Alternative Hypothesis	Null Hypothesis
H.2-4	Character-based variables	Character-based variables will significantly predict the variance in PBC.	Character-based variables will **not** significantly predict the variance in PBC.
H.2-5	Socio-demo-graphic variables	Socio-demographic variables will significantly predict the variance in PBC.	Socio-demographic variables will **not** significantly predict the variance in PBC.
H.2-6	Objective control (OK)	Objective control will significantly predict the variance in PBC.	Objective control will **not** significantly predict the variance in PBC.

Table 128 – Correlation for Hypothesis H.2: Prediction of PBC/Composite Scores

	Composite Perceived Behavioural Control Score		Composite PBC Control Belief Score	Composite PBC Self-Assessment Score	Composite PBC Comfort Score	Composite PBC Certainty Score
	Pearson Correlation r	Coefficient of Determination r^2	Pearson Correlation r	Pearson Correlation r	Pearson Correlation r	Pearson Correlation r
Nationality	**0.054**	**0.3%**	0.083	0.019	0.007	0.088
Sex	**-.377****	**14.2%**	-.363**	-.302**	-.372**	-.283**
Study Subject (Business vs. Non-Business)	**.200****	**4.0%**	.144*	.260**	.184**	.115*
Personal Finance Education received prior to university studies	**.238****	**5.7%**	.142*	.233**	.270**	.206**
Education Legal Guardian All	**.121***	**1.5%**	0.092	.114*	.127*	0.095
Practical Experience SMP	**.564****	**31.8%**	.448**	.493**	.569**	.495**
B_RiskAversion=Group 5 - Do not know	**-.155****	**2.4%**	-.143*	-.192**	-.119*	-0.088
B_RiskAversion=Group 4 - Most Risk Averse	**-.142***	**2.0%**	-.151**	-0.092	-.140*	-.114*
B_RiskAversion=Group 3 - Risk Averse	**-0.088**	**0.8%**	-0.049	-0.089	-0.086	-0.099
B_RiskAversion=Group 2 - Medium Risk Averse	**.162****	**2.6%**	.167**	.148**	.135*	.118*
B_RiskAversion=Group 1 - Least Risk Averse	**.198****	**3.9%**	.148**	.188**	.196**	.175**
Risk Aversion (Q.6.1_Dichotomous)	**.292****	**8.5%**	.259**	.272**	.266**	.235**
Score - Disposition to Trust	**-0.032**	**0.1%**	0.023	-0.023	-0.064	-0.060
Score - Sociability	**.146****	**2.1%**	0.071	.165**	.133*	.168**
Score - Level of Optimism	**.143***	**2.0%**	0.085	.126*	.161**	.140*
Score - Money Preferences	**-0.029**	**0.1%**	-0.001	-0.066	-0.029	-0.008
Total Objective Financial Knowledge - SCORE	**.397****	**15.8%**	.314**	.404**	.370**	.319**
Basic Objective Financial Knowledge - SCORE	**.210****	**4.4%**	.171**	.195**	.190**	.196**
Advanced Objective Financial Knowledge - SCORE	**.422****	**17.8%**	.333**	.439**	.397**	.328**

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

The correlation analysis for the RAA predictor "PBC" indicates a large, positive effect size for "practical SMP experience" (r^2 = 31.8%, $p < 0.01$), which seems reasonable given that the respondents who are already active in the stock market exhibit a fair amount of confidence in and comfort with their own financial skills. This strong positive association holds across all the PBC assessment dimensions. Similar to the predictor "attitude", AOK (r^2 = 17.8%, $p > 0.01$) appears to be a significantly better predictor than BOK (r^2 = 4.4%, $p < 0.01$) for PBC as well. A medium negative effect size of r = -0.377 is noted for "sex" (r^2 = 14.2%, $p < 0.01$), indicating that women assess their own financial skills significantly more critically than men.

Table 129 – Multiple Regression (Prediction of PBC) – Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.688[a]	0.473	0.441	3.04066	0.473	14.763	18	296	0.000	
2	.742[b]	0.551	0.520	2.81737	0.078	25.389	2	294	0.000	1.918

a. Predictors: (Constant), Total Objective Financial Knowledge - SCORE, B_RiskAversion=Group 1 - Least Risk Averse, Q2.20=I live alone (only adult in household), Personal Finance Education received prior to university studies, Score - Disposition to Trust, Score - Money Preferences, B_RiskAversion=Group 3 - Risk Averse, Sex, Score - Sociability, Study Subject (Business vs. Non-Business), B_Edu_Guardian_ALL=Academic, Nationality, B_RiskAversion=Group 4 - Most Risk Averse, Q2.20=I live in my parents' home, Score - Level of Optimism, Practical Experience SMP, B_RiskAversion=Group 2 - Medium Risk Averse, Q2.20=I live with other family, friends, or roommates.

b. Predictors: (Constant), Total Objective Financial Knowledge - SCORE, B_RiskAversion=Group 1 - Least Risk Averse, Q2.20=I live alone (only adult in household), Personal Finance Education received prior to university studies, Score - Disposition to Trust, Score - Money Preferences, B_RiskAversion=Group 3 - Risk Averse, Sex, Score - Sociability, Study Subject (Business vs. Non-Business), B_Edu_Guardian_ALL=Academic, Nationality, B_RiskAversion=Group 4 - Most Risk Averse, Q2.20=I live in my parents' home, Score - Level of Optimism, Practical Experience SMP, B_RiskAversion=Group 2 - Medium Risk Averse, Q2.20=I live with other family, friends, or roommates., Composite Attitude Score , Composite Perceived Norm Score

c. Dependent Variable: Composite Perceived Behavioural Control Score

The second step is comprised of a hierarchical multiple linear regression analysis, which is summarised in Table 129. The Model 2 R-value of 0.742 ($R_{\text{PBC Model 2}} = 0.742$), representing the multiple correlation coefficient between the predictors and the outcome, indicates a large effect size when applying the criteria stipulated in Table 106. The R-square for Model 2 is 55.1% ($\text{R-square}_{\text{PBC Model 2}} = 0.551$), suggesting that the model can explain a significant portion of the variance of the outcome variable "PBC".

Table 130 summarises the model's coefficients. Among the socio-demographic variables, "sex", "study subject", and "practical SMP experience" contribute significantly to predicting PBC. "Personal finance education" is statistically significant only in Model 1. Particularly noticeable is the negative coefficient for "sex", suggesting that female students in general have a lower assessment of PBC. In contrast, "study subject", "personal finance education", and "practical SMP experience" as well as "objective control" (which is also a significant predictor of the model) are fundamentally knowledge-based factors with positive coefficients. The significance of these variables suggests that financial education might contribute significantly to increasing PBC. In terms of character-based variables, the dummy variable "risk aversion group 1 – least risk averse" as well as "sociability" were found to be statistically significant, indicating that higher levels of risk tolerance and sociability might also make a modest contribution to PBC. Model 2 adds the RAA predictors FA and PSN; however, only FA is statistically significant.

Table 130 – Multiple Regression (Prediction of PBC) – Statistically Significant Standardised Coefficients

Predictor Variables [a.]	Model 1			Model 2		
	Beta β	Sig.		Beta β	Sig.	
Sex	-0.235	0.000	A)	-0.218	0.000	B)
Study Subject (Business vs. Non-Business)	0.106	0.025	A)	0.100	0.024	A)
Personal Finance Education received prior to university studies	0.102	0.026	A)	0.078	0.065	B)
Practical Experience SMP	0.392	0.000	A)	0.314	0.000	A)
Score - Sociability	0.096	0.036	A)	0.091	0.033	A)
B_RiskAversion=Group 1 - Least Risk Averse	0.145	0.023	A)	0.137	0.023	A)
Total Objective Financial Knowledge - SCORE	0.171	0.001	A)	0.120	0.011	A)
Composite Attitude Score	N/A	N/A	C)	0.303	0.000	A)

A) Statistically Significant at p<0.05
B) Statistically insignificant but significant in prior model(s)
C) Not included in Model
a. Dependent Variable: Composite Perceived Behavioural Control Score

Consequently, the null hypotheses H.2-4 to H.2.6 can be accepted for a range of variables but rejected for others, as outlined above. The conclusions of the secondary hypothesis testing are summarised in section 4.2.3.6 (see Table 137).

4.2.3.4 Prediction of Perceived Social Norms

No.	Predictor Variables	Alternative Hypothesis	Null Hypothesis
H.2-7	Character-based variables	Character-based variables will significantly predict the variance in PSN.	Character-based variables will **not** significantly predict the variance in PSN.
H.2-8	Socio-demo-graphic variables	Socio-demographic variables will significantly predict the variance in PSN.	Socio-demographic variables will **not** significantly predict the variance in PSN.
H.2-9	Actual control (OK)	Actual control (OK) will significantly predict the variance in PSN.	Actual control (OK) will **not** significantly predict the variance in PSN.

The correlation analysis for the RAA predictor "PSN" indicates a medium effect size for "practical SMP experience" (r^2 = 11.2%, $p < 0.01$), which seems reasonable given that the respondents who are already active in the stock market might either socialise with like-minded persons or have salient referents such as legal guardians who encouraged them to participate at a reasonably young age in the first place. Similar to the predictors "FA" and "PBC", a higher level of AOK (r^2 = 7.6%, $p < 0.01$) and TOK (r^2 = 7.7%, $p < 0.01$) appears to be predictive of a higher level of PSN. "Education of legal guardian" (r^2 = 6.8%, $p < 0.01$) is also predictive of a more positive PSN. Surprisingly, as no statistically significant association was noted between "living arrangements" for either "FA" or "PBC", the dummy variables indicating "living in parents' home" and "living with other family, friends, or roommates" registered a statistically significant correlation. In the case of "living in parents' home", this correlation is negative (r = -0.119, r^2 = 1.4%, $p < 0.05$). This might suggest that students who are living at home are

subject to a lower degree of social norms, which is reasonable considering that the composite PSN score is an aggregate score of all the referents deemed relevant. It can reasonably be expected that respondents who are still living at home consider other referents (such as roommates or fellow students) as less salient than, say, respondents who are "living with family, friends, or roommates" (r^2 = 3.7%, $p < 0.01$).

Table 131 – Correlation for Hypothesis H.2: Prediction of PSN/Composite Scores

	Composite Perceived Norm Score		Composite Injunctive Norm Score	Composite Descriptive Norm Score
	Pearson Correlation r	Coefficient of Determination r^2	Pearson Correlation r	Pearson Correlation r
Nationality	**0.102**	**1.0%**	0.079	0.096
Sex	**0.021**	**0.0%**	0.004	0.057
Study Subject (Business vs. Non-Business)	**.214****	**4.6%**	.181**	.160**
Personal Finance Education received prior to university studies	**.179****	**3.2%**	.151*	.137*
Education Legal Guardian All	**.260****	**6.8%**	.236**	.223**
Practical Experience SMP	**.334****	**11.2%**	.277**	.365**
B_RiskAversion=Group 5 - Do not know	**0.047**	**0.2%**	0.012	0.096
B_RiskAversion=Group 4 - Most Risk Averse	**-0.059**	**0.3%**	-0.062	-0.038
B_RiskAversion=Group 3 - Risk Averse	**-0.052**	**0.3%**	-0.052	-0.060
B_RiskAversion=Group 2 - Medium Risk Averse	**0.079**	**0.6%**	0.097	0.028
B_RiskAversion=Group 1 - Least Risk Averse	**-0.011**	**0.0%**	0.003	-0.004
Risk Aversion (Q.6.1_Dichotomous)	**0.064**	**0.4%**	0.089	0.022
Score - Disposition to Trust	**-.156****	**2.4%**	-.164**	-0.069
Score - Sociability	**.170****	**2.9%**	.147*	.195**
Score - Level of Optimism	**.184****	**3.4%**	.201**	0.054
Score - Money Preferences	**-.140***	**2.0%**	-.150*	-0.013
Total Objective Financial Knowledge - SCORE	**.277****	**7.7%**	.254**	.192**
Basic Objective Financial Knowledge - SCORE	**.191****	**3.6%**	.165**	.135*
Advanced Objective Financial Knowledge - SCORE	**.276****	**7.6%**	.258**	.190**
Q2.20=I live in my parents' home	**-.119***	**1.4%**	-.117*	-0.059
Q2.20=I live with other family, friends, or roommates.	**.193****	**3.7%**	.168**	.171**

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 132 summarises the hierarchical regression model. The R-value of 0.603 ($R_{\text{PSN Model 2}}$ = 0.603) representing the multiple correlation coefficient between the predictors and the outcome indicates a large effect size when applying the criteria stipulated in Table 106. The R-square for the model is 36.4% (R-square $_{\text{PSN Model 2}}$= 0.364), suggesting that the model can explain a substantial portion of the variance of the outcome variable "PSN".

Table 132 – Multiple Regression (Prediction of PSN) – Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.524[a]	0.275	0.231	12.56424	0.275	6.230	18	296	0.000	
2	.603[b]	0.364	0.320	11.81009	0.089	20.505	2	294	0.000	2.039

a. Predictors: (Constant), Total Objective Financial Knowledge - SCORE, B_RiskAversion=Group 1 - Least Risk Averse, Q2.20=I live alone (only adult in household), Personal Finance Education received prior to university studies, Score - Disposition to Trust, Score - Money Preferences, B_RiskAversion=Group 3 - Risk Averse, Sex, Score - Sociability, Study Subject (Business vs. Non-Business), B_Edu_Guardian_ALL=Academic, Nationality, B_RiskAversion=Group 4 - Most Risk Averse, Q2.20=I live in my parents' home, Score - Level of Optimism, Practical Experience SMP, B_RiskAversion=Group 2 - Medium Risk Averse, Q2.20=I live with other family, friends, or roommates.

b. Predictors: (Constant), Total Objective Financial Knowledge - SCORE, B_RiskAversion=Group 1 - Least Risk Averse, Q2.20=I live alone (only adult in household), Personal Finance Education received prior to university studies, Score - Disposition to Trust, Score - Money Preferences, B_RiskAversion=Group 3 - Risk Averse, Sex, Score - Sociability, Study Subject (Business vs. Non-Business), B_Edu_Guardian_ALL=Academic, Nationality, B_RiskAversion=Group 4 - Most Risk Averse, Q2.20=I live in my parents' home, Score - Level of Optimism, Practical Experience SMP, B_RiskAversion=Group 2 - Medium Risk Averse, Q2.20=I live with other family, friends, or roommates., Composite Attitude Score , Composite Perceived Behavioural Control Score

c. Dependent Variable: Composite Perceived Norm Score

Table 133 summarises the model's statistically significant standardised coefficients. Among the socio-demographic variables, "study subject" (Model 1 only) and "practical SMP experience" significantly contribute to predicting PSN. "Practical SMP experience" and "objective control" (which is a significant predictor in Model 1 but not in Model 2 after the inclusion of PBC) are fundamentally knowledge-based factors with positive coefficients. "Risk aversion" (in the form of dummy variables for Groups 1 and 2) was found to be statistically significant with a negative coefficient, which might suggest that less risk-averse persons might be prone to being less receptive to social norms in terms of "risky behaviour", such as SMP. However, as the risk aversion groupings do not exhibit any statistically significant correlation with PSN, the corresponding null hypothesis cannot be rejected.

Table 133 – Multiple Regression (Prediction of PSN) – Statistically Significant Standardised Coefficients

Predictor Variables [a.]	Model 1			Model 2		
	Beta β	Sig.		Beta β	Sig.	
Study Subject (Business vs. Non-Business)	0.109	0.048	A)	0.101	0.054	
Practical Experience SMP	0.290	0.000	A)	0.198	0.001	
B_RiskAversion=Group 2 - Medium Risk Averse	-0.138	0.095		-0.157	0.045	
B_RiskAversion=Group 1 - Least Risk Averse	-0.183	0.015	A)	-0.206	0.004	
Total Objective Financial Knowledge - SCORE	0.126	0.033	A)	0.068	0.231	
Composite Attitude Score	N/A	N/A	C)	0.321	0.000	
Composite Perceived Behavioural Control Score	N/A	N/A	C)	0.053	0.445	

A) Statistically Significant at p<0.05

B) Statistically insignificant but significant in prior model(s)

C) Not included in Model

a. Dependent Variable: Composite Perceived Norm Score

Consequently, the null hypotheses H.2-7 to H.2.9 can be accepted for a range of variables but rejected for others, as outlined above. The conclusions of the secondary hypothesis testing are summarised in section 4.2.3.6 (see Table 137).

4.2.3.5 Prediction of Actual Control (OK)

No.	Predictor Variables	Alternative Hypothesis	Null Hypothesis
H.2-10	Character-based variables	Character-based variables will significantly predict the variance in OK.	Character-based variables will **not** significantly predict the variance in OK.
H.2-11	Socio-demo-graphic variables	Socio-demographic variables will significantly predict the variance in OK.	Socio-demographic variables will **not** significantly predict the variance in OK.

The measurement of the associations across all the measures of OK (TOK, AOK, BOK, and OK-3) appears to be fairly consistent. The comprehensive measures (TOK and AOK) seem to generate stronger effect sizes and will therefore be used for further analysis. TOK and AOK achieve a high degree of correlation ($r = 0.962$, $r^2 = 92.5\%$, $p < 0.01$), which is not surprising given the higher number of AOK question items included in TOK. A medium positive effect size is noted for "practical SMP experience" ($r^2 = 12.5\%$, $p < 0.01$), which again suggests that actual SMP might have a positive reinforcing effect with OK (see also section 2.5.3.3 in this context which suggests that studies have shown experience to be positively correlated with a higher level of OK respectively FL).

Table 134 – Correlation for Hypothesis H.2: Prediction of AC

	Total Objective Financial Knowledge - SCORE		Advanced Objective Financial Knowledge - SCORE	Basic Objective Financial Knowledge - SCORE	Basic Objective Financial Knowledge - SCORE - Big Three
	Pearson Correlation r	Coefficient of Determination r^2	Pearson Correlation r	Pearson Correlation r	Pearson Correlation r
Nationality	.218**	4.8%	.179**	.239**	.223**
Sex	-.255**	6.5%	-.257**	-.169**	-.214**
Study Subject (Business vs. Non-Business)	.258**	6.7%	.278**	.128*	.189**
Personal Finance Education received prior to university studies	0.070	0.5%	0.084	0.017	0.063
Education Legal Guardian All	.209**	4.4%	.182**	.205**	.212**
Practical Experience SMP	.353**	12.5%	.356**	.235**	.351**
B_RiskAversion=Group 5 - Do not know	-0.110	1.2%	-.125*	-0.041	-0.013
B_RiskAversion=Group 4 - Most Risk Averse	-0.022	0.0%	-0.034	0.012	-0.092
B_RiskAversion=Group 3 - Risk Averse	-0.025	0.1%	-0.018	-0.034	-0.011
B_RiskAversion=Group 2 - Medium Risk Averse	.129*	1.7%	.127*	0.092	0.072
B_RiskAversion=Group 1 - Least Risk Averse	-0.011	0.0%	0.009	-0.054	0.043
Risk Aversion (Q.6.1_Dichotomous)	0.109	1.2%	.122*	0.044	0.097
Score - Disposition to Trust	-.128*	1.6%	-.114*	-.120*	-.117*
Score - Sociability	0.024	0.1%	0.015	0.037	0.030
Score - Level of Optimism	.152**	2.3%	.147**	.116*	0.109
Score - Money Preferences	-0.096	0.9%	-0.087	-0.086	-0.109
Q2.21=Supported by parents and/or other relatives	0.081	0.7%	0.052	.122*	.114*

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 135 summarises the hierarchical regression model. Model 1 of the regression analysis contains the relevant background factors, while Model 2 adds the RAA predictors, with the TOK score being the outcome variable. The R value of 0.569 ($R_{AC\ Model\ 2} = 0.569$), representing

the multiple correlation coefficient between the predictors and the outcome, indicates a large effect size when applying the criteria stipulated in Table 106. The R-square for the model is 36.4% (R-square $_{AC\ Model\ 2}$ = 0.323), suggesting that the model can explain a substantial portion of the variance of the outcome variable "PSN".

Table 135 – Multiple Regression (Prediction of AC) – Model Summary

					Change Statistics					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change	Durbin-Watson
1	.539[a]	0.291	0.248	3.60136	0.291	6.724	18	295	0.000	
2	.569[b]	0.323	0.275	3.53577	0.033	4.682	3	292	0.003	2.132

a. Predictors: (Constant), B_Edu_Guardian_ALL=Non-Academic, Q2.20=I live alone (only adult in household), Sex, B_RiskAversion=Group 1 - Least Risk Averse, Score - Money Preferences, Score - Disposition to Trust, Study Subject (Business vs. Non-Business), B_RiskAversion=Group 3 - Risk Averse, Personal Finance Education received prior to university studies, Score - Sociability, Nationality, B_RiskAversion=Group 4 - Most Risk Averse, Q2.20=I live in my parents' home, Practical Experience SMP, Score - Level of Optimism, B_RiskAversion=Group 2 - Medium Risk Averse, Q2.20=I live with other family, friends, or roommates., B_Edu_Guardian_ALL=Academic

b. Predictors: (Constant), B_Edu_Guardian_ALL=Non-Academic, Q2.20=I live alone (only adult in household), Sex, B_RiskAversion=Group 1 - Least Risk Averse, Score - Money Preferences, Score - Disposition to Trust, Study Subject (Business vs. Non-Business), B_RiskAversion=Group 3 - Risk Averse, Personal Finance Education received prior to university studies, Score - Sociability, Nationality, B_RiskAversion=Group 4 - Most Risk Averse, Q2.20=I live in my parents' home, Practical Experience SMP, Score - Level of Optimism, B_RiskAversion=Group 2 - Medium Risk Averse, Q2.20=I live with other family, friends, or roommates., B_Edu_Guardian_ALL=Academic, Composite Attitude Score , Composite Descriptive Norm Score , Composite Perceived Behavioural Control Score

c. Dependent Variable: Total Objective Financial Knowledge - SCORE

Table 136 – Multiple Regression (Prediction of AC) – Statistically Significant Standardised Coefficients

Predictor Variables [a.]	Model 1			Model 2		
	Beta β	Sig.		Beta β	Sig.	
Nationality	0.205	0.000	A)	0.205	0.000	B)
Sex	-0.202	0.000	A)	-0.150	0.008	A)
Study Subject (Business vs. Non-Business)	0.244	0.000	A)	0.208	0.000	A)
Practical Experience SMP	0.234	0.000	A)	0.119	0.073	B)
Composite Perceived Behavioural Control Score	N/A	N/A	C)	0.184	0.010	A)

A) Statistically Significant at p<0.05

B) Statistically insignificant but significant in prior model(s)

C) Not included in Model

a. Dependent Variable: Total Objective Financial Knowledge - SCORE

Table 136 summarises the model's statistically significant standardised coefficients. The positive coefficients for "nationality" ($p < 0.01$) and "study subject" ($p < 0.01$) suggest that German and, respectively, business students (confirming similar findings in prior research, see section 2.5.3.2) on average achieve a higher TOK score. The negative coefficient for "sex" ($p < 0.01$) confirms the prior research findings that women on average perform worse than men on FL (OK) assessments (see section 2.5.3.1). While "practical SMP experience" is statistically significant in Model 1, it is insignificant in Model 2 on the introduction of the RAA predictors, notably the composite PBC score. While the findings on "study subject" and "sex" confirm prior research, other factors frequently associated with higher FL (OK) levels, such as experience (class rank) and age, are not confirmed by this research. However, this research focused exclusively on undergraduate students, who comprise a fairly homogeneous group in terms of age and experience (see section 4.1.2.1). Character-based factors do not appear to

be significant in the prediction of OK levels. Consequently, the null hypotheses H.2-10 to H.2-11 can be accepted except for “nationality”, “sex”, and “study subject”. The conclusion of the secondary hypothesis testing is summarised in section 4.2.3.6 (see Table 137).

4.2.3.6 Summary of Secondary Hypothesis Testing

Table 137 – Summary of Secondary Hypothesis Testing

Predictor Variables		Attitude (FA)			Perceived Behavioural Control (PBC) (Subjective Financial Knowledge)			Perceived Social Norms (PSN)			Actual Control (AC) (Objective Financial Knowledge)	
		H.2-1	H.2-2	H.2-3	H.2-4	H.2-5	H.2-6	H.2-7	H.2-8	H.2-9	H.2-10	H.2-11
Socio-Demographic Variables	Nationality		$H.2\text{-}2_0$			$H.2\text{-}5_0$			$H.2\text{-}8_0$			$H.2\text{-}11_a$
	Sex		$H.2\text{-}2_0$			$H.2\text{-}5_a$			$H.2\text{-}8_0$			$H.2\text{-}11_a$
	Study Subject (Business vs. Non-Business)		$H.2\text{-}2_0$			$H.2\text{-}5_a$			$H.2\text{-}8_0$			$H.2\text{-}11_a$
	Personal Finance Education received prior to university studies		$H.2\text{-}2_0$			$H.2\text{-}5_0$			$H.2\text{-}8_0$			$H.2\text{-}11_0$
	Education Legal Guardian All		$H.2\text{-}2_0$			$H.2\text{-}5_0$			$H.2\text{-}8_0$			$H.2\text{-}11_0$
	Practical Experience SMP		$H.2\text{-}2_0$			$H.2\text{-}5_a$			$H.2\text{-}8_a$			$H.2\text{-}11_0$
Character-based Variables	Score - Disposition to Trust	$H.2\text{-}1_0$ *)			$H.2\text{-}4_0$			$H.2\text{-}7_0$			$H.2\text{-}10_0$	
	Score - Sociability	$H.2\text{-}1_0$			$H.2\text{-}4_a$			$H.2\text{-}7_0$			$H.2\text{-}10_0$	
	Score - Level of Optimism	$H.2\text{-}1_a$			$H.2\text{-}4_0$			$H.2\text{-}7_0$			$H.2\text{-}10_0$	
	Score - Money Preferences	$H.2\text{-}1_0$			$H.2\text{-}4_0$			$H.2\text{-}7_0$			$H.2\text{-}10_0$	
	Risk Aversion_Grouping	$H.2\text{-}1_0$			$H.2\text{-}4_0$ *)			$H.2\text{-}7_a$			$H.2\text{-}10_0$	
Actual Control	Total Objective Financial Knowledge			$H.2\text{-}3_0$			$H.2\text{-}6_a$			$H.2\text{-}9_0$		

Legend
Null Hypothesis accepted
Null Hypothesis rejected, Alternative Hypothesis substantiated

**) Variable is statistically significant in the Regression Model, however no significant correlation is noted. Therefore, the Null Hypothesis cannot be rejected.*

As summarised in Table 137, the secondary hypothesis testing showed a differentiated picture, indicating that the predictors for the RAA variables are varied and no single socio-demographic or character-based variable dominates. When statistically controlling for other variables, “actual control” (H.2-6) predicts PBC and the null hypothesis can be rejected: due to the conceptualisation of OK as AC and SK as PBC, this relationship could reasonably be expected. However, while correlated, a higher level of OK does not appear to be predictive of more positive FA and PSN (null hypotheses accepted) in itself when controlling simultaneously for PBC. For the socio-demographic variable “practical SMP experience”, the null hypotheses (H.2-5, H.2-7) can be rejected except for FA and AC. The literature frequently finds a gender gap (see sections 2.4.4.2 and 2.5.3.1) to the extent that women possess a lower degree of financial knowledge as well as more negative self-assessment thereof than men. This study also found evidence for the existence of this gender gap: the variable “sex” predicts a negative impact on “PBC” and “AC” for female respondents (alternative hypotheses $H.2.5_a$ and $H.2\text{-}11_a$ substantiated). FA appears to be predicted only by the character-based variable “level of optimism”. “Nationality”, “sex”, and “study subject” are socio-demographic predictors of AC. It is further noticeable that “education of legal guardian” and “personal finance education” do not appear to be relevant predictors within this framework, suggesting limited relevance in the context of this research.

4.2.4 Conclusion

The hypothesis testing led to the following key findings:

- The null hypothesis for all the primary hypotheses (H.1-1, H.1-2, H.1-3, and H.1-4) can be rejected. The RAA model with the predictor variables FA, PBC, and PSN as well as AC can explain a significant portion of the variance in the outcome variable BI (R-square $_{\text{BI Model 3}}$ = 0.581).
- All the RAA predictor values make a statistically significant contribution to the linear regression model.
- Based on the standardised β values in Regression Model 3 (see section 4.2.2.2.1), PSN (β = 0.254, p < 0.001) has the highest predictive impact on the outcome variable, followed by PBC (β = 0.228, p < 0.001) and FA (β = 0.194, p < 0.001). AC (β = 0.135, p < 0.01) also contributes significantly and, combined with PBC, has the highest predictive impact, documenting the relevance of the FL construct to the prediction of BI.
- A higher level of AC (OK) appears to be predictive of a more positive PBC (H.2-6_a substantiated), while it does not predict FA or PSN (null hypotheses H.2-3_0 and H.2-9_0 substantiated).
- The attitude component "wealth-creating capacity" appears to have the strongest association with BI. Substituting the composite attitude score with the component "Score Q.11.1 Wealth-Creating Capacity/Semantic Differential" in the alternative linear regression Model 4 leads to a noticeable improvement: the R-square for the alternative model is 64.5% (R-square $_{\text{BI Model 4}}$ = 0.645), which is an improvement of 6.4 percentage points over the RAA predictor model (R-square $_{\text{BI Model 3}}$ = 0.581; see section 4.2.2.2.1). In this instance, "wealth-creating capacity" becomes the dominating predictor based on β = 0.438 (p < 0.001).
- The secondary hypothesis testing revealed a differentiated picture, indicating that the predictors for the RAA variables are varied and no single socio-demographic or character-based variable dominates. The hypothesis testing found evidence for the existence of a gender gap: the variable "sex" predicts a negative impact on PBC and AC for female respondents (alternative hypotheses H.2.5_a and H.2.11_a substantiated).

Based on the empirical findings presented in this chapter, a conceptual framework is outlined in section 4.3.2.

4.3 Discussion of the Findings

4.3.1 Introduction

The preceding sections presented an analysis of the data collected by means of the questionnaire (Appendix C). Section 4.1 explored the data following a univariate approach, while section 4.2 covered the hypothesis testing, applying bivariate and multivariate statistical methods. Based on these analyses, the following section discusses the findings as well as their implications. Although correlational research generally does not allow for the inference of direction and causality, it is still reasonable to discuss potential causal interpretations of the associations noted (Hayes, 2018). The RAA describes a chain of causal effects in which behavioural, normative, and control beliefs are the fundamental building blocks that determine FA, PSN, and PBC, ultimately producing BI and leading to FB (Fishbein & Ajzen, 2010, p. 306). Nevertheless, Fishbein and Ajzen (2010) caution that correlational data (as is the case with the empirical data in this study) cannot establish causal effects in a definitive way. Consequently, any causal references and interpretations in the ensuing discussion follow the causality suggested by the sequence of RAA factors and need to be considered with the caveat of the research design's limitation.

4.3.2 Prediction of SMP Behavioural Intention

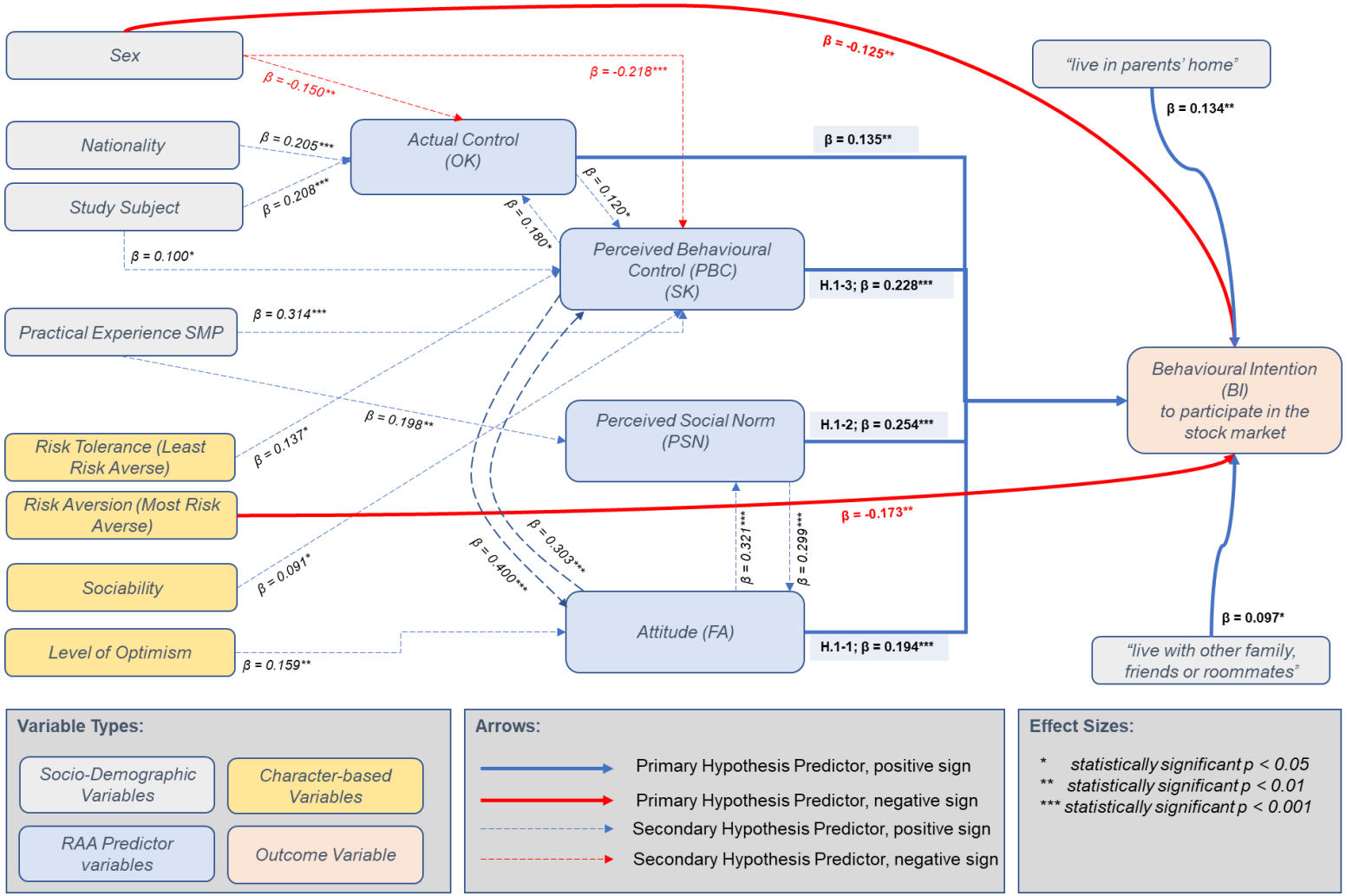
4.3.2.1 Conceptual Framework and Model Fit

This research contributes to the SMPP as well as the FL literature from a specific German perspective by applying the RAA framework to analyse the factors predicting the behavioural intention of university students to participate in the stock market by means of a survey instrument (Appendix C) designed specifically for this research study and the empirical evidence obtained.

The SMPP research to date (see Table 13 in section 2.4) is largely conducted by means of large-scale consumer surveys representing a broad and mature population sample or by focusing specifically on mature respondents or those nearing retirement. In contrast, this study concentrates exclusively on undergraduate students at a German university, thus assessing the factors associated with SMP and BI for this specific group of potential investors. To that extent, the study questionnaire comprehensively assessed the attitude (FA), perceived behavioural control (PBC), perceived social norms (PSN), and actual control (AC) of respondents with specific regard to their intention to participate in the stock market. Detailed socio-demographic data as well as an evaluation of character-based variables were also covered. The data analysis procedures included an examination of the correlations between relevant variables as well as multiple linear regression on the outcome variable to determine the relationships relevant to understanding the factors concerning behavioural intention in the

SMP context. The findings of the data analysis, as presented in sections 4.1 and 4.2 support the validity of the data collected for all the variables in the scope of the analysis. The collected data confirm the relevance of the RAA framework for explaining behavioural intentions as the regression models achieved a good model fit based on the R-square, with the predictor variables explaining 58.1% (Regression Model 3; see Table 118) and, respectively, 64.5% (Regression Model 4; see Table 121) of the variance in the outcome variable BI and all the RAA predictor variables (FA, PSN, and PBC) making a statistically significant ($p < 0.001$ for all RAA variables) positive contribution to the prediction of BI. These results compare favourably with the results achieved by applying the RAA/TPB for the prediction of behavioural intention in other fields (see section 3.2.1.2), thus suggesting that the RAA is a highly relevant framework for the assessment and prediction of SMP BI and potentially other FB. The results of the hypothesis testing led to the formulation of a conceptual framework for the prediction of SMP BI, as outlined in Figure 38; the results for the individual elements are discussed in the following sections.

Figure 38 – Conceptual Framework – SMP Behavioural Intention Model



Note: The β values noted are based on the BI linear regression in Model 3 (see Table 118) and the respective linear regression models in the secondary hypothesis testing (see section 4.2.3)

4.3.2.2 Behavioural Intention

The prediction of BI was the focus of the primary hypothesis testing (see section 4.2.2). The empirical evidence suggests that the null hypotheses for all the primary hypotheses (see the summary in Table 138) can be rejected. The RAA predictor variables (FA, PSN, and PBC) are statistically highly significant ($p < 0.001$) and – based on the β values – provide the strongest contribution to the BI prediction. Based on BI Model 2 (not including AC/TOK as a predictor; see Table 120), PSN and PBC make a comparable contribution, while the contribution made by FA is slightly smaller. The inclusion of AC (TOK score) as a predictor in the model (BI Model 3; see Table 120) appears to decrease the contribution of PBC, while AC registers a statistically significant ($p < 0.01$) contribution. The results show that a higher level of FL (conceptualised two-dimensionally as AC/OK and PBC/SK, respectively) is a significant positive predictor of BI. These results may contribute to the endogeneity concerns, suggesting that the direction and/or causality of the relationship between FL and FB is difficult to establish due to unobserved individual characteristics (Eugster, 2019; Fernandes et al., 2014).

The comprehensive questionnaire for this research covered a number of character-based as well as socio-demographic factors previously found to be relevant to the prediction of SMP (see section 2.4.4) and FL (see section 2.5.3). Despite controlling for these factors in the linear regression model, the explanatory significance of FL (predictor variables PBC and AC) remains highly relevant, suggesting that FL is in fact relevant to the formulation of behavioural intention. Nevertheless, the empirical results indicate that FL is not the only relevant predictor as the contributions of PSN and FA are also highly significant. In fact, when substituting the composite attitude score with the relevant score for the sub-dimension "wealth-creating capacity" of the stock market (alternative model; see section 4.2.2.2.2 and Table 123), the acknowledgement of the "wealth-creating capacity" ($\beta_{\text{BI Model 4}} = 0.438$) becomes by far the strongest positive predictor of BI. This suggests that an understanding (fundamentally a matter of OK) and acknowledgement of this SMP feature might be a key step in forming a positive BI. However, considering the OK assessment (see Table 100 and Table 102 in section 4.1.6.3), only 45.7% of the respondents correctly identified stocks as the asset class generally offering the highest return over a long period of time (Q.13.11), implying that – also from an OK perspective – this is not a widely understood fact. Besides the expected contribution of the RAA factors and AC, a number of other variables appear to be statistically relevant to predicting BI: female respondents (socio-demographic variable "sex") are less likely than men to formulate a positive BI, providing empirical evidence for the gender gap (see the separate discussion in section 4.3.4). Furthermore, the most risk-averse respondents (dummy variable for risk aversion Group 1; see section 3.2.2.5.1) are also less likely to entertain the possibility of BI. Both effects make a statistically significant negative contribution to the prediction of BI.

Furthermore, respondents who registered their current status of living (Q.2.20) as either "live in parents' home" or "live with other family, friends, or roommates" are also more likely to consider SMP. While these variables are not predictive of any of the other predictor variables (testing of the secondary hypotheses), they make a positive contribution directly to the prediction of BI. This might suggest some form of socialisation factor that is apparently not captured by the RAA predictor variables (in particular PSN). However, further research would be required to determine the origin of this unexpected direct contribution.

Table 138 – Conclusion on the Primary Hypotheses/Prediction of BI

No.	Alternative Hypothesis	Conclusion
H.1-1	Stock market attitudes (FA) positively influence intention to participate in the stock market (BI).	$H.1\text{-}1_a$
H.1-2	PSN positively influence intention to participate in the stock market (BI).	$H.1\text{-}2_a$
H.1-3	PBC (SK) positively influence intention to participate in the stock market (BI).	$H.1\text{-}3_a$
H.1-4	The predictor variables (FA, PSN, PBC) will significantly explain the variance in the outcome variable intention to participate in the stock market (BI).	$H.1\text{-}4_a$

Legend
Null Hypothesis accepted
Null Hypothesis rejected, Alternative Hypothesis is substantiated

4.3.2.3 Attitude

The data analysis in section 4.2.2.1.1 and section 4.2.2.2 showed that FA is the third-largest contributor to the prediction of BI when based on the composite attitude score. The composite attitude score yielded a Pearson's correlation of 0.540 ($r = 0.540$, $p < 0.001$) with the BI composite score and thus FA accounts for a share of 29.2% of the variation in BI. The correlational analysis (section 4.2.2.1.1) further shows that both the composite direct attitude score ($r = 0.527$, $p < 0.001$) and the composite indirect measurement score ($r = 0.454$, $p < 0.001$) are highly correlated with BI. Similarly, the individual direct and indirect scores for the individual attitude dimensions (see Table 108 and Table 109), with the exception of "facilitators" (both measurement approaches) and "fast money" (only the indirect measurement approach), are correlated with BI (albeit generally at a lower level of correlation, with the exception of "wealth-creating capacity) at the 0.01 level ($p < 0.01$). It is noticeable that the direct measure "wealth-creating capacity" shows the highest correlation with BI ($r = 0.710$, $p < 0.001$), leading to the formulation of the alternative linear regression model (Model 4 in section 4.2.2.2.2), substituting the composite attitude score for the score of the direct measure "wealth-creating capacity". This led to the result that – besides improving the predictive fit of the regression model as measured by the R-square – FA and, respectively, "wealth-creating capacity" are by far the strongest positive predictor of BI within the regression model (see also

the previous section 4.3.2.2). This clearly suggests that understanding the stock market's potential for long-term wealth creation might be the strongest overall factor in BI prediction. Consequently, this implies that measures aimed at changing behaviour by positively influencing intention – such as financial education initiatives – should place sufficient focus on this finding. In turn, the level of FA (measured as the "composite attitude score") can be predicted by PSN ($r = 0.537$, $p < 0.01$; $\beta = 0.299$, $p < 0.001$) as well as the character-based variable "level of optimism" ($H.2.1_a$; $r = 0.217$ and $\beta = 0.159$, both $p < 0.01$). Despite the limitations of correlational research in establishing direction or causality, it is a reasonable extrapolation to assume that socialisation (as expressed by the variable PSN) might shape FA. However, this interpretation requires confirmation by a suitable research design.

4.3.2.4 Perceived Social Norm

PSN ($\beta = 0.254$, $p < 0.001$) is the largest single contributor to the prediction of BI when based on BI Regression Model 3 (see section 4.2.2.2.1; Model 3 in Step 1 including the "composite attitude score"). The composite perceived norm score yielded a Pearson's correlation of 0.494 ($r = 0.540$, $p < 0.001$) with the BI composite score and thus PSN accounts for 24.4% of the variation with BI. The correlational analysis (section 4.2.2.1.2) shows that both the composite injunctive norm score ($r = 0.452$, $p < 0.001$) and the composite descriptive norm score ($r = 0.454$, $p < 0.001$) are highly correlated with BI. For both descriptive and injunctive norms, the father (male guardian) and, respectively, parents (legal guardian) as well as "best friends" appear to be the most relevant salient referents, which is reasonable considering the respondents' stage of their life cycle, during which family and best friends might be the most relevant referents. Nevertheless, all the referents – with the exception of "partner", which is not surprising given the age bracket of the respondents, and "public opinion" – are correlated at a statistical significance level of $p < 0.01$ with BI. PSN is predicted by FA (composite attitude score; $\beta = 0.321$, $p < 0.001$); although correlational research does not allow for inferences, the interpretation of this relationship suggests that PSN influences FA (see the previous section) rather than the other way around. "Practical SMP experience" ($r = 0.334$, $p < 0.01$/$\beta = 0.134$, $p < 0.01$) is relevant to the prediction of PSN when statistically controlling for all the other relevant variables. It is reasonable to interpret this as indicating that, having obtained practical experience with SMP at a young age and given the relevance of the salient referents "parents" and "best friend", PSN is particularly effective in shaping BI and ultimately FB. The empirical evidence on PSN also corroborates prior research indicating that SMP is positively associated with social norms and, in particular, the influence of parents on young adults might be an important factor (see section 2.4.4.5).

4.3.2.5 Perceived Behavioural Control (Subjective Financial Knowledge)

PBC ($\beta_{\text{BI Model 2}} = 0.263$, $p < 0.001$/$\beta_{\text{BI Model 3}} = 0.228$, $p < 0.001$) is the largest single contributor to the prediction of BI when based on BI Regression Model 2 (see section 4.2.2.2.1; Model 2 in Step 1 excluding the "TOK score"); however, that contribution decreases slightly in BI Regression Model 3 with the inclusion of AC (OK), which is in itself a significant contributor (see the subsequent section for a detailed discussion). The results confirm the prior research finding that a higher level of SK increases the willingness to pursue risky investments (Bannier & Neubert, 2016; Hadar et al., 2013). Furthermore, the importance of PBC (SK) in predicting BI provides further empirical evidence for the suggestion by Allgood and Walstad (2016) that SK and OK appear to influence FB and that SK may be as important as OK. While correlational research cannot definitively establish causality, the results from this research suggest that, for the prediction of BI, PBC (SK) is the more influential variable when compared with AC (see the subsequent section for a separate discussion). Allgood and Walstad (2016) suggested that SK is not simply a different measure for OK but may act through a different mechanism; this research finds that, while the level of AC (OK) is primarily predicted by socio-demographic factors (see the subsequent section as well as the conceptual framework in Figure 38), character-based variables such as "risk tolerance (least risk-averse group)" ($\beta_{\text{PBC Model 2}} = 0.137$, $p < 0.05$) and "sociability" ($\beta_{\text{PBC Model 2}} = 0.091$, $p < 0.05$) appear to contribute positively to PBC (SK). The notion of a different mechanism finds further empirical evidence as PBC and AC – while highly positively correlated at $r = 0.397$ ($p < 0.001$) – share only 15.76% of the variation (coefficient of determination $r^2 = 0.1576$). Additionally, the empirical evidence supports the prior findings of a gender gap working through lower FL (see sections 2.4.4.2 and 2.5.3.1) as "sex" ($\beta_{\text{PBC Model 2}} = -0.218$, $p<0.001$) negatively contributes to PBC, suggesting that female respondents have a lower degree of SK and that business students ($\beta_{\text{PBC Model 2}} = -0.100$, $p < 0.05$) have a slightly higher PBC than non-business students (see section 2.5.3.2).

4.3.2.6 Actual Control (Objective Financial Knowledge)

AC ($\beta_{\text{BI Model 3}} = 0.135$, $p < 0.01$) – although not formally a predictor variable for BI within the RAA framework (compare Table 14 in section 3.2.1.1) – exhibits a significant, positive contribution to BI. This suggests that it is reasonable to include AC (OK) in the conceptual framework as a formal BI predictor variable. In turn, socio-demographic variables previously identified in FL research (see section 2.5.3) are indicative of variations in the levels of AC (OK) of university students. These variables include "sex"[20] ($\beta_{\text{AC Model 2}} = -0.150$, $p < 0.01$) and "study subject" ($\beta_{\text{AC Model 2}} = 0.208$, $p < 0.001$), suggesting that men and, respectively, business students have a higher level of OK. However, other factors, such as "age" and "education

[20] The negative sign of the β factor suggests that women have a lower level of OK than men.

level" (compare section 2.5.3.3), were not found to be predictors of OK. In this context, the homogeneous nature of the underlying population and the sample should be noted as all the respondents are in similar age brackets (see Table 61) and possess similar levels of education (pursuing an undergraduate degree). "Practical SMP experience" (compare "experience" in section 2.5.3.3) and "education of legal guardian" (compare section 2.5.3.4) were found to be highly correlated with both "TOK score" and "AOK score" (see Table 134 in section 4.2.3.5) at $p < 0.01$. However, neither factor is a significant predictor of AC within the linear regression model (see Table 136 in section 4.2.3.5) when statistically controlling for the other factors, including the RAA predictors. This finding suggests that these factors – while relevant – work primarily through other mechanisms within the overall framework. A detailed discussion of the OK assessment results follows in the next section.

4.3.3 Assessment of Objective Financial Knowledge

The detailed analysis of the OK assessment is presented in section 4.1.6. It is noticeable that the OK assessment results vary significantly based on the level of assessment. While 81.0% of the respondents achieved an adequate BOK score (mean score of 3.66 questions answered correctly out of 5 BOK questions, indicating a mean score of 73.27% of BOK questions answered correctly), only 41.0% of the respondents achieved an "adequate" AOK assessment (mean score = 7.4190 out of 13 questions, indicating a mean of 57.1% of AOK questions answered correctly). In combination, this leads to an "adequate" TOK assessment for just over half of the respondents (indicating a mean of 61.6% of TOK questions answered correctly). For 21 studies reporting OK assessments of university students (see section 2.5.2.5 and Appendix B), the mean percentage of correct answers is 57%, suggesting that the respondents in this study scored slightly above average. A study by Ergün (2018) assessing OK based on 20 items that were not SMP specific for German university students (N = 62 comprising undergraduate, graduate, and post-graduate students) noted a mean score of 73.7%. However, the advanced nature of the questions asked (in particular the subject-specific AOK questions) needs to be taken into consideration when comparing results with other OK assessments. Comparing the results with those of van Rooij et al. (2011b), on whose assessment instrument this OK assessment is largely based, yields a positive result: van Rooij et al. (2011b) report 78.8% of BOK questions and 53.9% of AOK questions answered correctly.[21] Consequently, the respondents in this research scored overall slightly better. However, the differences in the sample population have to be taken into consideration as van

[21] Van Rooij et al. (2011b) report a mean of 3.94 correct answers for the 5 BOK questions and a mean of 5.93 of correct answers for the 11 AOK questions. The instrument utilised by van Rooij et al. (2011b) comprises 16 items in total (see section 3.2.2.2.2).

Rooij et al.'s sample contains a representative cross-section of the Dutch population with a mean age of 49.6 compared with 98.7% of respondents who are below the age of 30 in this research study. Considering that prior research frequently finds that OK increases with age to a certain extent (see sections 2.4.4.3 and 2.5.3.3) – as is also a finding of van Rooij et al. (2011) – the OK assessment of this research can be seen to compare favourably. Nevertheless, assuming that SMP is a desired FB, an improvement of OK could be expected to lead to an increase in BI as well. The "adequate" TOK rating of roughly half the population certainly leaves room for improvement. In particular, consider that only 28.6% of the respondents indicated that they had received personal finance education prior to (Q.2.8) and only 17.8% during (Q.2.12) university studies, although the factor "personal finance education received prior to university studies" was not found to be statistically significant in predicting OK levels. The TOK adequacy levels of international students (24.5% TOK adequate) and women (35.9% TOK adequate) are particularly low when compared with the overall mean (see section 4.1.6.2). Whereas for international students the challenge of potentially answering the OK assessment questions in a non-native language might explain this deviation, the result achieved by female respondents is a further indicator of the gender gap.

From an SMP perspective, it is noticeable that items relevant to an understanding of SMP's wealth-creating capacity, including basic concepts such as the "time value of money" (Q.13.5) as well as advanced concepts such as "asset return expectations" (Q.13.11) and "asset risk expectations" (Q.13.12), achieved very dissimilar results: while overall 80.0% of the participants correctly identified stocks as the most risky asset class, only 45.7% correctly identified stocks as the asset class with the long-term highest return expectation, while only 55.6% showed an understanding of the time value of money (see section 4.1.6.3 for details). In particular, the disparity in the risk and return assessment of stocks reiterates a previous finding in a study on German high-school students (Erner et al., 2016), which – if confirmed to be persistent on an overall population level – might be a potential explanation for the comparative reluctance of German households (Grabka & Westermeier, 2015; Stolper & Walter, 2017) to engage in SMP. Overall, the OK assessment indicates that the performance is similar to that in other studies on university students yet leaves significant room for improvement. The detailed analysis of correct and incorrect responses by question item (concept tested) might also provide valuable input for designing financial education initiatives aimed at promoting SMP.

4.3.4 Other Observations

As already noted in the previous sections, this research study confirms the prior research finding of a gender gap in relation to both SMP (see section 2.4.4.2) and FL (see section 2.5.3.1). This study presents empirical evidence that female respondents achieve a lower level

of AC/OK (see section 4.1.6.2), exhibit a lower level of PBC/SK (sections 4.2.2.1.3 and 4.2.2.2), and consequently also have a lower BI to participate in the stock market than male respondents. These findings suggest that the lower BI might primarily be influenced by lower levels of FL (measured by OK and SK), confirming similar conclusions with regard to SMP (Almenberg & Dreber, 2015; Eugster, 2019; Vohra & Kaur, 2016). However, this study did not find statistically significant evidence that female respondents exhibit a higher level of risk aversion (see section 4.1.2.3) than men. Consequently, the prior research findings to that effect cannot be confirmed (Almenberg & Dreber, 2015; Halko et al., 2012).

Prior research suggests that SMP is related to risk aversion to the extent that a lower level of risk aversion or loss aversion might lead to a higher rate of SMP (see section 2.4.4.4). This study found supportive empirical evidence for that notion as risk aversion (dummy variable "Group 1 – most risk averse") has a statistically significant negative and direct impact on BI (see section 4.2.2.2). In contrast, the empirical findings suggest that a higher level of risk tolerance (dummy variable "Group 4 – least risk averse") does not directly affect BI but rather works indirectly by means of a higher level of PBC (see section 4.3.2.1).

As outlined in section 4.3.2.6, "education level of legal guardian" was not found to be a significant predictor of AC despite correlations with TOK and AOK assessment. While prior FL research frequently concludes that the education level of parents is a significant predictor of children's level of FL (see section 2.5.3.4), this finding cannot be corroborated by the empirical evidence in this study. In fact, the comprehensive RAA framework approach suggests that parents' education level works through a multitude of approaches as the correlational analysis suggests statistically significant and positive associations between the academic education of the parents and FA (see Table 125), PBC (see Table 128), PSN (see Table 131), and AC (see Table 134). Consequently, while "education of legal guardian" is not a statistically significant predictor in the linear regression analysis, the bivariate analysis with positive associations with all the predictors of BI suggests an important role of parental education.

Prior research documents that social people who interact more frequently in social settings are more likely to learn about investing (see section 2.4.4.5). In this context, this research finds supporting evidence as "sociability" positively predicts PBC. However, the notion that sociability as a character trait and social norms can be deemed to be closely interrelated (Baker & Nofsinger, 2002) cannot be comprehensively confirmed by the empirical evidence: on the one hand, a statistically significant correlation between "sociability" and PSN can be noted (see Table 131); however, "sociability" is not a significant predictor of PSN in the regression analysis (see Table 133).

A lack of trust in financial institutions (Mauricas et al., 2017) as well as in the stock market in general (Guiso et al., 2008) might be associated with lower SMP. Although trust in financial institutions or the stock market was not specifically assessed in this study, some parallels can be drawn to the FA dimensions “regulators” (section 4.1.3.4) and “fairness” (section 4.1.3.8), which suggest that the respondents have overall a fairly neutral attitude towards regulators and the question of stock market fairness (direct measurement approaches). Nevertheless, the bivariate statistical analysis suggests that, for both direct and indirect measurement approaches, a statistically significant correlation can be identified between the FA dimensions “regulators” and “fairness” and BI (see section 4.2.2.1.1).

5 Conclusion

5.1 Key Findings

This research contributes to the SMPP and FL literature by examining the relationship between FL and normative and attitudinal factors in undergraduate students' SMP intention at a German university. Furthermore, the study offers new insights by determining which mechanisms and variables frequently associated with higher SMP or FL rates in earlier research might relate to BI. The study also comprises a performance assessment of OK with a focus on specific stock market knowledge (AOK) among German university students.

Improving on earlier financial behaviour conceptual frameworks (Huston, 2010; Tang et al., 2015) and considering applications of TPB (see section 3.2.1.3) to FL and SMP research, this research outlines a conceptual framework that comprehensively specifies both variables as well as measurement approaches to factors previously generalised as "other influences" (Huston, 2010) and being criticised as being omitted from prior FL research (Fernandes et al., 2014).

The empirical findings suggests that a comprehensive application of RAA might be a useful framework for the analysis of BI and ultimately FB, not only limited to the SMPP aspect. Multiple linear regression modelling of the RAA framework leads to a reasonably good model fit, explaining between 58.1% (BI Model 3; see Table 118) and 64.5% (alternative BI model; see Table 121) of the outcome variable BI which compares well to prior studies applying the RAA/TPB[22]. All the RAA predictor variables as well as TOK make a statistically significant ($p < 0.01$) contribution. Based on the standardised coefficient β (BI Model 3; see Table 120), PBC/SK ($\beta = 0.228$, $p < 0.001$) and AC/OK ($\beta = 0.135$, $p < 0.01$) combined make the strongest contribution to the prediction of BI, thus validating the importance of the FL construct for BI and arguably FB. Furthermore, this finding supports earlier research suggesting that a two-dimensional approach to FL comprised of SK and OK as distinct and equally important components might be a useful unit of analysis. This research finds that SK appears to be the more important component when it comes to the prediction of BI. Furthermore, attitudinal (FA: $\beta = 0.194$, $p < 0.001$; see Table 120) and normative (PSN: $\beta = 0.254$, $p < 0.001$; see Table 120) factors contribute significantly to the prediction of BI. In particular, positive recognition of the FA dimension "wealth-creating capacity" of the stock market has a very high predictive

[22] Raut (2020) reports an R-Square of 36% for a convenience sample of self-administered questionnaires (N = 390) utilizing the TPB to measure intention to SMP while Sivaramakrishnan et al. (2017) report an R-Square of 58% and Pascual-Ezama, Scandroglio, & de Liaño, (2014) and R-Square of 61% for prediction of BI related to SMP.

value for BI (see section 4.2.2.2.2), thus providing a valuable insight as a possible starting point for relevant financial education programmes aiming to increase SMP. Identification of the wealth-creating capacity of the stock market (see also section 2.4.2) might serve also as motivation for engaging in long-term planning to make use of the superior return potential of the stock market. In a related context, Eugster (2019) finds that an individuals' propensity for long-term planning is positively related to SMP when controlling for FL as well as background factors.

Furthermore, the study finds consistent evidence for the existence of a gender gap, indicating that women are less likely to participate in the stock market (see section 4.3.2.1) as well as possessing a lower level of FL across both SK (see section 4.1.5) and OK (see sections 4.1.6 and 4.2.3.5) dimensions. The character-based variable "risk aversion" is statistically significant across all BI prediction models at $p < 0.01$, with a negative coefficient suggesting that risk-averse persons are less likely to participate in the stock market. No other character-based factors are found to be statistically significant in predicting BI; however "sociability" and "level of optimism" appear to be predictive of PBC and FA, respectively. "Practical SMP experience" makes a highly positive contribution to the prediction of "PBC" and "PSN" and – while not considered as a formal measurement of FB in the RAA context[23] – is consistently associated with a higher level of FL and FA. Future research might expand on this finding by also measuring actual SMP (FB) longitudinally within the RAA framework.

The performance assessment of OK suggests an adequate level of BOK (81.0% adequate), whereas only 41.0% of the respondents achieved an "adequate" AOK assessment. In combination, these results lead to an "adequate" TOK assessment for just over half of the respondents amounting to a mean percentage of correct answers of 61.6%. While these results are comparable to OK assessments in other studies, the results in particular for the AOK level of knowledge leave room for improvement. A recent study by Ergün (2018) noted a higher mean percentage of 73.7% of correct OK answers (based on a 20 question instrument) for German university students (N=62) comprising undergraduate, graduate as well as postgraduate students. The AOK assessment indicates a knowledge gap between stock returns and risk characteristics reiterating a similar finding for German high-school students to that extent (Erner et al., 2016). This knowledge gap might be a key factor in explaining the SMPP in the German context, requiring further investigation.

The survey instrument compiled and developed for this research encompasses a comprehensive RAA application in an SMP context and was shown to be valid and reliable. Consequently, the instrument might be deployable to other relevant questions and populations.

5.2 Implications and Contributions

5.2.1 Contributions

This study contributes to the SMP and FL knowledge base of young adults by assessing the relationships and predictive contributions of lower-order socio-demographic and character-based background variables to higher-order predictor variables and ultimately BI as the relevant outcome variable. The comprehensive application of the RAA framework confirms observations of factors previously identified as being associated with higher SMP rates as well as higher levels of FL and suggests more detailed explanations of the mechanisms through which these factors might ultimately influence BI (see the detailed analysis in section 4.2.2). Furthermore, the research framework provides additional insights concerning the observation that the relationship between FL and FB diminishes when controlling for psychological traits (Fernandes et al., 2014) by including these psychological traits comprehensively within the research as character-based variables and demonstrating the importance of both these traits and higher-order constructs, such as FA and PSN, to the prediction of BI while confirming the relevance of the relationship between FL (conceptualised as AC/OK and PBC/SK) and BI. The study's findings also support the notion that conceptualising FL only as OK might have limited predictive value whereas conceptualising FL two-dimensionally as distinct constructs of OK and SK improves the predictive and explanatory value since the results also confirm the notion (Allgood & Walstad, 2016) that these are distinct concepts. Finally, this study contributes to the evolution of theoretical FL/FB frameworks promulgated by Huston (2010) and Tang et al. (2015) by proposing a conceptual framework (see section 4.3.2.1) based on the empirical findings of this research.

For the purpose of this research, a comprehensive instrument (see Appendix C) was developed that combines instruments from prior SMP and FL research (Allgood & Walstad, 2016; Dobni & Racine, 2015, 2016; Knoll & Houts, 2012; van Rooij et al., 2011b) with the application of the RAA approach methodology (Fishbein & Ajzen, 2010). The results of this study confirm the validity and reliability of this instrument. Consequently, the instrument might be of interest to researchers as it can be deployed in other relevant settings and populations with comparatively minor modifications.

5.2.2 Implications

The study confirms the importance of the positive influence of FL (OK and SK) on the intention to engage in beneficial FB. Consequently, the results might also be of interest to practitioners seeking to develop or improve financial education programmes to enhance SMP in general or for specific groups (such as women) in particular. The results of both the univariate analysis of FA, SK, and OK (see the discussion in section 4.3.2) and the multivariate analysis offer insights into matters that might be of interest for educational programme design on the university level, such as educating on the risk and return expectations for asset classes as well as the wealth-creating capacity of SMP over the longer term. A recent study by Gerrans & Heaney (2019) reports that personal finance education delivered to undergraduate students both improves OK and SK and delivers an additional gender effect, thus making the consideration of such programmes worthwhile. Finally, the study highlights that there might be no better indicator for continued SMP than actual SMP experience, suggesting that educational provision of such experience through appropriate offerings (e.g. long-term investing simulations) – not only within the confines of a business school – might be beneficial for the purpose of enhancing BI and ultimately FB with regard to SMP. Furthermore, the results of this study might be of interest to financial services professionals engaged in wealth management and financial advisory services to shape financial advice and communication with existing and potential young customers by addressing the aspects that are most relevant to this focus group.

5.3 Research Limitations

The scope of this study was limited by location and time (undergraduate students at a single German university during summer semester 2019) and focused specifically on SMP behavioural intentions and relevant antecedent variables. Consequently, the results of this research may not be applicable in all instances to students at other universities (domestic or abroad) due to the distinct international orientation of Reutlingen University, other finance subject matter behavioural intentions, or other populations of young adults. Caution therefore needs to be exercised in generalising the results to other populations and other personal finance subject matters. The research design is cross-sectional and does not actually determine whether behavioural intentions trigger the relevant behaviour. Correlational research, as utilised in this study, cannot in itself definitively establish causality. Consequently, any suggested causal relationships in the analysis and discussion are based on the expected interaction and causality of the RAA framework variables. However, these suggestions, as summarised in the resulting conceptual framework (see Figure 38), require validation with appropriate experimental research designs to validate the cause and effect relationships

definitively. The author encourages future researchers to address these issues (see also the subsequent section 5.4).

5.4 Areas for Further Research

This research study proposed a model for the prediction of BI. However, as outlined in section 5.3, correlational research is not conducive to establishing causality definitively. Consequently, further research could seek to validate the causality of the conceptual relationships suggested and deepen the understanding of the mechanisms through which BI and FB are influenced by both experimental and qualitative research designs. In particular, future research might seek to measure longitudinally whether, for young adults, BI actually translates into subsequent exercising of FB given that, at the university education stage, the financial means to do so might be the limiting factor. Furthermore, research could seek to validate the relationship between the lower-order background (character-based and socio-demographic) variables and the higher-order RAA predictor variables identified in this research and potentially expand the framework by assessing the relevance of further socio-demographic variables and character-based (behavioural) traits in the prediction of BI and FB. The mechanism through which the parental education level and socialisation influence the BI and FB of young adults might also warrant further detailed investigation. Furthermore, the survey instrument established could be adapted to other cultural backgrounds as well as other relevant FBs to seek validation of the conceptual model in different settings. The data set obtained for this research based on the questionnaire encompassing more than 80 items is comprehensive and might also provide a solid starting point for addressing further research questions.

5.5 Experience of Conducting this Research

The University of Portsmouth DBA programme emphasises reflection on experience and personal development. As part of the first-year DBA programme, a personal portfolio (see Appendix L) was established that defined – based on the Global Competency Inventory – interest flexibility, social flexibility, and emotional resilience as areas for further development for the author and included a reflection on the motivation for undertaking the DBA programme. The development areas flexibility and emotional resilience were severely stressed over the past years due to personal developments (the birth of the author's first child, Alexander, in February 2018) and unexpected severe health issues as well as extraneous factors (such as the Covid-19 crisis of 2020). Dealing with these challenges (in the case of my son, this challenge is the greatest blessing of my life) required adaptations to improve my resilience (change of nutrition and lifestyle and a focus on physical activity to manage health issues) and in particular my flexibility (balancing my new role as a father with my professional responsibilities and the simultaneous pursuit of the DBA candidature). Furthermore, the

cooperation with Reutlingen University afforded me the possibility to teach an undergraduate course in international financial reporting, which – while not strictly connected with the subject matter of this study – still offered me the opportunity to gain insights into the educational aspects of young adults that might also be of relevance to any future personal finance education aspirations. The evolution of the research purpose, development of the research design, execution of the pilot study, and data analysis and dissertation drafting, given the personal matters outlined above, posed a challenge, particularly as they required a steep learning curve not only in academic techniques (in particular quantitative methods), which at the outset of the DBA programme were very limited, but also in mundane tasks, such as familiarisation with and utilisation of relevant IT applications, such as SPSS, NVIVO, and Qualtrics. The guidance, feedback, and patience received from my supervisors was extremely supportive and helpful in charting my own path to manage the DBA-related challenges. The submission of this body of work arguably supports my conclusion that I have overcome these challenges and further motivates me to pursue a subsequent journal publication.

6 References

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7 Appendices

Appendix No.	Appendix Title	First referenced in Section
A	Literature Search Approach	2.1
B	Financial Literacy Literature – Research Synthesis Approach	2.5.1
C	Self-Completion Questionnaire	3.3.2
D	Elicitation Questionnaire	4.4.2.1
E	Cognitive Interview Transcript Example (German language)	4..4.2.2
F	Study Inclusion Criteria	4.5.1
G.1	Ethical Review Submission Form (Appendices not included)	4.5.3
G.2	Ethical Review Favourable Opinion	4.5.3
H	Questionnaire Distribution Email + Participant Information	4.5.3
I	SPSS Code Book	5.1
J	Multivariate Statistical Analysis – Hierarchical Multiple Regression Step 1 (SPSS Output)	6.2.2
K	Multivariate Statistical Analysis – Hierarchical Multiple Regression Step 2 Alternative Model (SPSS Output)	6.2.2
L	Personal Portfolio (DBA Programme)	8.5
M	UPR 16 Ethics Review Checklist	N/A